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With the assistance of

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"Stand still, and consider the wondrous works of God."—JOB.

"Each moss,
Each shell, each crawling insect, holds a rank
Important in the plan of Him who framed
This scale of beings; holds a rank which, lost,
Would break the chain, and leave behind a gap
Which Nature's self would rue."

THOMSON.

"Still, Edward must, to a great extent, have enjoyed a happy life. He was hopeful and cheerful. He had always some object to pursue with a purpose; that constitutes one of the secrets of happiness. He had an interesting hobby; that is another secret. Natural History is one of the most delightful of hobbies."—SMILES.

"If thou art worn and hard beset
With sorrows that thou wouldst forget,
If thou wouldst read a lesson that will keep
Thy heart from fainting and thy soul from sleep,
Go to the woods and hills! No tears
Dim the sweet look that Nature wears."

LONGFELLOW.

"The Will is the Key that opens the door to every path, whether it be of Science or of Nature; and everyone has it in his power to choose the road for himself."—THOMAS EDWARD.

"To me there never has been a higher source of earthly honour or distinction than that connected with advances in Science."

SIR HUMPHREY DAVY.

CONTENTS.

ALPHABETICAL LIST OF CONTRIBUTORS.

- Anderson, Joseph, jun. 74, 164
Bairstow, S. D. 73, 256
Baker, G. 254
Barrett, Charles G. 142
Barrett, J. Platt 237, 252, 265
Benson, Henry 252, 259
Beynon, F. 214
Bignell, G. C. 98, 99, 141
Bird, H. M. Golding 19, 137, 225
Bond, Frederick, F.Z.S. 1, 73, 120
Bowyer, R. W. 46
Butler, E. A. 153
Capper, Samuel J. 40
Carrington, John T. 2, 31, 80, 81, 169, 187, 209, 236
Cave-Browne, Rev. J., M.A. 162
Cole, B. G. 140
Cooke, Nicholas 92, 151
Cooper, Bernard 74, 135, 299
Corbin, G. B. 144
Crallan, Rev. Thomas E., M.A. 141
Crewe, Rev. H. Harpur, M.A. 295
Daltry, Rev. T. W., M.A., F.L.S. 286, 288
Doncaster, Arthur 48
Downing, W. 252
Dunbar, L. 141
Dunning, J. W., M.A., F.L.S., &c. 53, 99
Edwards, W. 254, 255
Eedle, Thomas 214, 253
Farini, G. A. 238
Farn, A. B. 134, 211, 252
Fitch, Edward A. 27, 44, 49, 52, 67, 86, 104, 105, 121, 124, 160, 166, 172, 191, 206, 210, 213, 234, 249, 279, 297, 300, 301
Fletcher, J. E. 24
Frere, Rev. E. H., M.A. 210
Fust, H. Jenner, M.A. 143
Gill, Battershell, M.D., F.Z.S. 50
Golding-Bird, C. H. and H. M. 225
Goss, H., F.L.S. 96, 285
Harper, W. J. 162
Harris, J. W. 211
Heath, James E. 19
Hedworth, Thomas H. 256
Hernaman, A. F. 162
Hodgkinson, J. B. 23, 100, 134, 142, 211, 256
Hunter, A. E. 259
Jackson, A. E. A. 254
Jennings, Rev. P. H., M.A. 46
Johnston, J. M. C. 300
Jonas, F. M. 97
Jones, A. H. 211, 253
Jones, H. 136
Kay, R. 191
Kenward, J. 288
Kerry, F. 286
Kirby, W. F. 108, 146, 198, 220, 241, 266, 290
Laddiman, R. 50, 237, 255, 286
Lang, H. C. 253
Leather, James 20
Livett, H. W., M.D. 133
Lovell, T. 238
Lowne, B. Thompson, F.R.C.S., F.L.S. 181, 193
Lowrey, P. 253
Machin, W. 49, 74, 75, 143, 163
Marshall, W. C. 135
Mathew, Gervase F., R.N., F.L.S., F.Z.S. 35, 70
May, J. W. 275
Meldola, R., F.C.S. 255
Melson, G. H. 300
Miller, H. jun. 210, 299
Mills, Rev. John W., M.A. 191

- Oakeshott, B. 237
 Ormerod, E. A. 42, 83, 165, 183, 217, 246, 280
 Parsons, W. E. 300
 Perkins, V. R. 99, 252, 258, 301
 Perrins, C. H. 254
 Pickard-Cambridge, Rev. O., M.A., C.M.Z.S. 154, 174, 202
 Pigg, G. R. 245
 Pilley, J. B. 237
 Porritt, G. T., F.L.S. 97, 137, 255, 258
 Power, J. A., M.D. 101
 Pratt, D. 255
 Prest, William 49, 129, 212
 Preston, J. 48
 Purdue, J. 143
 Robertson, Duncan 162
 Robinson, E. K. 131, 260, 299, 301, 303
 Robinson, W. 191
 Robson, John E. 288
 Rolfe, R. A. 253
 Rose, Arthur J. 286
 Salwey, R. E. 191
 Shadwell, John Logan 286
 Shaw, W. 23
 Service, Robert 304
 Sheppard, E. R. 47
 Sidgwick, Arthur 288
 Simmons, C. W. 257
 Smith, Frederick 60
 Sotheby, Rosa M. 253
 Spiller, A. J. 48
 Standen, R. S. 48
 Standish, F. O. 74, 100, 257
 Stevens, S., F.L.S., F.Z.S. 145
 Stowell, Rev. Hugh A., M.A. 287
 Tasker, Rev. J. C. W. 112
 Taylor, T. H. 254
 Thornewill, Rev. Chas. F., M.A. 254, 258, 260
 Thornthwaite, W. H. 99
 Threlfall, J. H. 21, 76, 100, 163
 Thurnall, A. 254
 Tugwell, W. H. 15, 48, 255, 283
 Waldegrave, Earl 236
 Weir, J. Jenner, F.L.S., F.Z.S. 25, 73, 190
 West, T. 300
 West, W. 303
 Weston, Walter P. 89, 117
 White, F. Buchanan, M.D., F.L.S. 9, 126, 168
 Williams, Rev. Henry, M.A. 48
 Wilson, Thomas 302
 Windybank, A. J. 285
 Wratishaw, Rev. A. H., M.A. 135, 300

ALPHABETICAL LIST OF SUBJECTS.

- Abundance of larvæ 50
Acentropus niveus 90
Acherontia Atropos 5, 300; at Welbeck Abbey 253; at Harwich 286; larva, at Norwich 286; in August at Ipswich 299; at sea 300
Acidalia contiguaria 8
 " *degeneraria* 8
Acilius larva, structure of the ocelli 182
Acompocoris alpinus 13
Acronycta alni 31, 74, 257, 303; larva 141; at Three Bridges 237; at Birmingham 254; at Burton-on-Trent 254; at Derby 254; in Herefordshire 254; at Wakefield 254; in Staffordshire 286; near Derby 287; larva, at Rugby 288
Agelenides 174
Aglossa cuprealis 89
Aglossa pinguinalis 89
Agrotera nemoralis double-brooded 48; in abundance 89
Agrotis Helvetina 32
Allocotus rubidus var. *Moncreaffi* 14
Anarsia spartiella 50
Andrena ferox 62, 153
Andricus æstivalis 28
 " *amenti* 28
 " *glandium* 28
 " *quadrilineatus* 28
 " *ramuli* 251
 " *terminalis* 28
 " *testaceipes* 28
 " *trilineatus* 28
Anerastia lotella 118
Anticlea sinuata in Hertfordshire 48; larva 301
Apatura Iris 5
Aphilothrix albopunctata 27

- Aphilothrix autumnalis* 27
 „ *callidoma* 28
 „ *collaris* 27
 „ *corticis* (with figure) 165
 „ *glandulæ* 28
 „ *globuli* 27
 „ *marginalis* (with figure) 297, 298
 „ *solitaria* 27
Arge Galathea, var. (with figure) 205
Argynnis Adippe 252
 „ *Aglaia* 252
 „ *Dia* 5
 „ *Lathonia* 5, 162; variety 46
 „ *Niobe* 5
Argyresthia Andereggiella, larva 100
Aromia moschata in Scotland 304
 Arthropods' eyes 181, 193
Asphondylia pimpinellæ 30
 „ *ulicis* 30
 "Assembling" in *Geometræ* 140
Astata stigma 65

Bankia argentula 211
 Biographical Notices: No. I. Henry Doubleday (with portrait) 53;
 No. II. James Scott Bowerbank, LL.D., F.R.S. (with portrait) 169
Boletobia fuliginaria 8, 136
Bombyx rubi, parasites on larva 258, 301

Botys lancealis 91
 „ *nubilalis* 91
 „ *terrealis* 91
Bowerbank, James Scott, F.R.S., LL.D., death 104; Memoir 169
Brephos notha 162
 „ *parthenias* at Lea Bridge 162
Bruchus rufimanus 143
Butalis grandipennella 49
Butler, Arthur Gardiner, 'Illustrations of Typical Specimens of Lepidoptera-Heterocera in the Collection of the British Museum' (review) 191
 Butterflies, hibernation 190

Callimorpha Hera 7
Camptogramma fluviata 9, 303
Cantharis vesicatoria 255
 Captures at Witherslack 21, 256; at Epping 214; near Gateshead 256; in North Wales 256; at Sherwood Forest 257; in Staffordshire 288; near Hastings 299; near Petersfield, Hants 303

Cataclysta lemnalis 90
 'Catalogue of British Hymenoptera in the British Museum' (review) 77
Catephia alchymista 34
 Caterpillars' "horns" 164
Catocala electa 34
 „ *fraxini* 34
Cecidomyia Giraudi 30
 „ *lathyri* 30
 „ *onobrychis* 30
 „ *pruni* 30
 „ *rosæ* 30
 „ *serotina* 30
 „ *trifolii* 30
Cecidomyiæ 30
Cemiostoma Wailesella 164
 Centipede devouring a moth 260
Ceutorhynchus sulcicollis (with figures) 264
Chalcididæ 29
Chærocampa Celerio 6; at Southsea 253; at Eastbourne 300
 „ *Nerii* 6
Cidaria fulvata, var. (with figure) 120
 „ *immanata*, rearing 257
 „ *reticulata* 9; bred 211
Cleora glabraria, var. (with figure) 289
 Clover, young, and "fly" 213
Cnethocampa pityocampa 7
Coleophora albitarsella 100, 163
 „ *fuscocuprella* 100
 „ *genistæcolella* 50
 „ *juncicolella* 100
 „ *laricella* 100
 „ *pyrrhulipennella* 100
 „ *therinella* 163
 „ *virgaureella* 50
Coleophoridæ reared in 1876, 100
 Collections, educational 40
Colletes cunicularia 62
Colias Edusa, additional notes on 209; bred 210; a second brood 236; abundance 236; and other diurnal Lepidoptera, abnormal appearance in 1877, 187; in London 253; breeding 285; at Harwich 286
Colias Edusa var. *Helice* 135, 253
 „ *Hyale* in Essex and in Surrey 191
 Colorado Beetle (with figures) 217
 'Colorado Potato-Beetle' (review) 263
Corixa prominula 15
 Correspondents, answers to 24, 76, 168

Crabro ambiguus 66
 „ *signatus* 65

Crambites observed during the years	Elachista adscitella 164
1874, 1875, 1876, 117	„ apicipunctella 163
Crambus alpinellus 117	„ atricomella 164
„ latistrius 118	„ cinereopunctella 164
„ paludellus 118	„ dispunctella 164
„ sylvellus 118	„ gleichenella 164
„ tristellus 118	„ humilis 164
„ uliginosellus 118	„ Megerlella 164
„ verellus 118	„ poella 163
Crymodes exulis 32	„ serricornella 22
Cryptoblabes bistriga 119	Elymniinae 290
Cymus melanocephalus 13	Emmelesia blandiata 8, 143
Cynipidæ 27	Endromis versicolora 7
Cynips Kollari 28; gall 144	Ennomos alniaria 8
	Entomological Society of London 51, 260
Danainæ 198	Entomological Society, Lancashire and Cheshire 144, 215
Danais Archippus 4; in Sussex 73	Entomological tour in Switzerland, six weeks' 112
Dasycampa rubiginea 33	'Entomology, Economic' (review) 102
Deilephila Euphorbiae 6	Entomology in Cornwall 141; practical 166; at Tresco and the Scilly Isles 295
„ Galii 6	Epëirides 202
„ lineata (livornica) 6, 191, 286	Ephestia artemisiella 119
Deiopeia pulchella 7	„ elutella 119; a destructive insect 212
Depressaria atomella 75	„ pinguis 118
„ costosella 53	Ephyra omicronaria, larva 137
„ nanatella 75	„ orbicularia, larva 97
„ propinquella 163	Epione vespertaria 7
Dianthæcia albiglacula 33	Epunda lutulenta var. Lunebergensis 33
„ Barrettii 33	
„ irregularis 33, 300	Erastria venustula 34, 214
Diasemia literalis 90	Erebia Ligea 5
Dicranura bicuspis in Staffordshire 286	Eupithecia consignata 8
Dicrorampha, notes on some of the genus 23	„ debiliata 9, 288
Dictynides 174	„ extensaria 8
Diplosis tremulæ 30	„ Knautiata 8
Doryphora decemlineata 101, 238 (with figures), 217	„ subciliata 9
Doubleday, Henry, Memoir 53	„ subumbrata 8
Drassides 158	„ tæniata 8
Dryophanta scutellaris 27	„ togata 9
Dysderides 158	„ trisignata(?) 8
Dytiscus larva, structure of the ocelli 182	„ unifasciata 299, 303; near Cambridge 254
	Eurytoma depressa 29
Ebulea sambucalis and E. (stachydalis) (with figures) 81	„ hyalipennis 29
„ stachydalis 91	Euthemonia russula 47
'Economic Entomology' (review) 102	Eye, compound, function 194
Educational collections 40	Eyes, aconic 194
Egg and development of the Phytotus (with figures) 280	„ eueonic 195
Eggs of Leptogramma Boscana, L. scabrana bred from 303	„ faceted, structure of the 193
Eidophasia Messingella 75	„ of Arthropods, abstract of a paper by Dr. H. Grenacher 181, 193

- Eyes, pseudoconic 194
 „ simple and compound, morphological relations 196
- Fens, Norfolk, a few days in the 15
 “Fly” and young clover 213
- Food of *Tortrix viburnana* 49, 74; of *Lobophora viretata* 98
- Food-plant, curious, of *Nyssia zonaria* 258
- Gall of *Cynips Kollari*, inhabitants 44
- Gall-maker new to Britain (with figure) 124
- Gall-producers, new and rare British, observed since the year 1872, 27
- Galls on *Quercus cerris* 42
- Gelechia albipalpella* 143
 „ *diffiniella* 76
 „ *Hermannella* 75
 „ *ligulella* 76
 „ *morosa* 211
 „ *næviferella* 75
 „ *tenebrella* 76
 „ *tenebrosella* 76
 „ *triparella* 75
 „ *viscariella* 76
 „ *vorticella* 76
- Gelechiidæ* reared in 1876, 75
- Geometra papilionaria* 245
 „ *smaragdaria* 8
- Geometræ*, “assembling” 140
- Glover, Townsend, ‘Manuscript Notes from my Journal; or Illustrations of Insects, Native and Foreign’ (review) 262
- Gonoptera libatrix in Aberdeenshire 141
- Gymnancycla canella* 119
- Habits of East Indian Insects, especially Lepidoptera 266
- Hadena peregrina* 33
 „ *satura* 99
- Healy, Charles, death 52
- Heliothis armigera* near Bristol 48; life-history 283; near Hartlepool 288; on the South Coast 255
 „ *dipsacea*, larva 301
 „ *peltigera* 255, 295
 „ *scutosa* 34, 99, 211; identity 142
 „ „ (with figure) 105
- Hemiptera, new and rare, observed during the years 1874, 1875, 1876, 9
- Hormomyia Fischeri* 30
- “Horns” of caterpillars 164
- Hybernation of wasps 144; of butterflies 190
- Hydrilla palustris* 32, 99, 211; at Wicken Fen 211
- Hydrocampa nymphæalis* 90
- Hydrometra aspera* 15
- Hylesinus fraxini*, workings (with figures) 183
- Hymenoptera, aculeate, notes on new and rare species taken during 1874, 1875, 1876, 61
- ‘Hymenoptera, British, Catalogue of in the British Museum’ (review) 77
- Inflation, preservation of Lepidopterous larvæ by (with figures) 225, 258
- Inhabitants of Kollari gall 44
- Insect, *Ephestia elutella* a destructive 212
- Insects, double-brooded 50; destructive to crops, introduction and spreading of, an Act for preventing 239; East Indian, especially Lepidoptera, habits 266
- ‘Insects, Illustrations of, Native and Foreign’ (review) 262
- Introductory papers on Lepidoptera 146, 198, 220, 241, 290
- Iodis vernaria*, note on 74
- Isocolus scabiosæ*: a Cynipideous gall-maker new to Britain (with figure) 124
- Ivy, a few words on 133
- Lampronia Luzella* 75
 „ *prælatella* 75
- Lancashire and Cheshire Entomological Society 144, 215
- Laphygma exigua* 32, 255; at Camberwell 300
- Larva of *Polia xanthomista* var. *nigrocincta* 20, 33; of *Lithosia molybdeola* 46; of *Ephyra orbicularia* 97; of *Argyresthia Andereggiella* 100; of *Ephyra omicronaria* 137; of *Acronycta alni* 141, 238; of *Dytiscus* and *Acilius*, structure of the ocelli 182; of *Sphinx convolvuli* 237; of *Bombyx rubi*, parasites 258, 301; of *Polia flavocincta* feeding on *Magnolia* 279; of *Acherontia Atropos* at Norwich 286; of *Dianthæcia irregularis* 300; of *Anticlea sinuata* 301; of

- Heliothis dipsacea* 301; of *Leptogramma scabrana* 303
 Larvæ, Micro-Lepidopterous, list of 34; of *Triphæna subsequa* 48; abundance 50; Lepidopterous, preservation by inflation (with figures) 225, 258
Laverna ochraceella 163
 ,, *Raschkiella* 101
 ,, *rhamniella* 163
Lemiodes pulveralis 92
 'Lepidoptera - Heterocera, Illustrations of Typical Specimens in the Collection of the British Museum' (review) 191
 Lepidoptera, new and rare British, observed during the years 1874, 1875, 1876, 2, 31, 89; in the Norfolk Fens 15; easily overlooked 81; melanism in 92, 151; foreign, formation of a collection 108; of Switzerland 112; melanochoism, &c., in 126; melanism and variation in 129; causes of melanism in 131; introductory papers on 146, 198, 220, 241, 290; localities 146; *Colias Edusa* and other diurnal, abnormal appearance in 1877, 187; rare, in Cambridgeshire Fens 211; rare, on the South Coast 255; East Indian 266; near York 302
Leptogramma scabrana bred from the eggs of *L. Boscana* 303
Leucania albipuncta 31, 255; at Deal 255; in the Isle of Wight 288
 ,, *extranea* 31
 ,, *vitellina* in the Isle of Wight 288
 Lewis, William Arnold, death 264
 Life-histories of Sawflies 275
 Life-history of *Heliothis armigera* 283
Limacodes asellus 214
Lithosia molybdeola, larva 46
 ,, *quadra* 7
Litosoma Douglassi 14
Lobophora viretata, food 98
 Localities (regions) of Lepidoptera 146
Lopus sulcatus 13
Lycæna Acis 5, 19
 ,, *Arion*, notes on 35, 70, 96, 135
 ,, *Corydon* at Hastings 253
Lycænidæ, late appearance 299
Lycosides 204
Macaria alternata 8, 48
Macrocoleus tanacetii 13
Macrogaster arundinis 211
 Macro-Lepidoptera 2, 31
 Macro-Lepidopterous larvæ, list of 34
Macropis labiata 62
 'Manuscript Notes from my Journal' (review) 262
Margarodes unionalis 255, 296
Mecyna polygonalis 92, 255
Melanagria Galathea, var. (figure) 265
Melanippe tristata 9
 Melanism in Lepidoptera 92, 151; and variation in 129; causes 131
 Melanochoism, &c., in Lepidoptera 126
Meliana flammea 32, 211
Melitæa Artemis, var. (with figure) 193
 ,, *Athalia*, var. *Eos* (with figures) 145
 ,, *Didyma* in the South of Scotland (with figure) 26
 Metamorphosis of *Stauropus fagi* 137
Microgaster 302
 Micro-Lepidoptera, new and rare, observed during the years 1874, 1875, 1876, 89, 117
Micropteryx calthella 75
 Mites, naphthaline for killing 260
Morphinæ 290
 Moth, Centipede devouring 260
 Murray, Andrew, F.L.S., 'Economic Entomology' (review) 102
Mutilla Europæa 64
Myelois ceratonix, re-discovery 134
Myrmedobia tenella 14
Nabis Poweri 14
 ,, *rugosus* 15
 Naphthaline for killing mites 260
Nascia ciliialis 90, 211
 Natural-History Society, Hackney 173
 Naturalist, a Scotch 51
Nematus baccarum 29
 ,, *cinereæ* 28
 ,, *crassipes* 29
 ,, *crassulus* 29
 ,, *Lugdunensis* 275
 ,, *ribesii* (ventricosus) and *N. consobrinus* 24
 ,, *viminalis* 29
 ,, *Vollenhovenii* 29
 Nepticula, new British, supposed discovery 134
Neuroterus fumipennis (with figures) 121, 123
 ,, *læviusculus* 28 (with figures), 121, 123

- Neuroterus lanuginosus* (with figure) 160
 „ *lenticularis* (with figures) 86, 123
 „ *minutulus* (with figure) 172
 „ *numismatis* (with figure) 67
 „ *ostreus* (with figure) 161
 „ *saliens* (with figure) 172
Noctua flammata 32
 „ *sobrina* 32
Nola albulalis 7
 „ *centonalis* 7
Nomada Bridgmaniana 63
Nonagria brevilinea 32
 Note on the larva of *Polia xanthomista* var. *nigrocincta* 20, 33; on *Orthotænia antiquana* 23; on *Iodis vernaria* 74
 Notes on some of the genus *Dicro-rampa* 23; on *Lycæna Arion* 35, 70, 96, 135; on new and rare species of aculeate Hymenoptera 61; on *Crambites* 117; on *Colias Edusa* 209; on pupa-digging 259; on the egg and development of the *Phytoptus* (with figures) 280
 Notices, biographical 53, 169
Nymphalidæ 198, 220, 241, 290
Nyssia zonaria 215; curious food-plant 258
 Oak-galls, descriptions (with figures) 67, 86, 121, 160, 165, 172, 206, 234, 249, 297
 „ Turkey (with figure) 42
Odontia dentalis 89
Odynerus reniformis 67
Ophiodes lunaris 34
Orthostira macrophalma 13
 „ *nigrina* 13
Orthotænia antiquana, note on 23
Osmia fuciformis 63
Oxybelus mucronatus 65
Pachetra leucophæa 32
Pachnobia hyperborea 32
Panurgus dentipes 63
Papilio Machaon in Essex 191; in Kent 252, 299; in Sussex 285
 „ *Xuthus* with *P. Xuthulus*, identity of 97
Paraponyx stratiotalis 90
 Parasites on larva of *Bombyx rubi* 258, 301
Pempelia genistella 119
Peritreechus nubilus 13
Petasia nubeculosa 31, 162
Phibalapteryx lapidata 9
Phycis betulella 119
Phylloxerous ravages in the Cognac district 44
Phytocoris pini 13
Phytoptus of the birch-knots (with figures) 83; notes on the egg and development (with figures) 280
Pieris Daphidice 5
Piezostethus formicetorum 14
Pilophorus clavatus 13
 „ *perplexus* 13
Pionea extimalis 91
Platypteryx sicula 31
Plesiödema pinetellum 14
Plodia interpunctella: new locality 142
Plusia orichalcea 303
Polia flavocincta larva feeding on *Magnolia* 279
 „ *xanthomista* var. *nigrocincta*, larva 20, 33
Pompilus approximatus 64
 'Potato-Beetle, Colorado' (review) 263
 Practical Entomology 166
 Preservation of larvæ by inflation 225
Psallus diminutus 14
Pseudopterpnæ cytisaria 74
 Pupa-digging, notes on 259
Pyrausta punicealis 89
Pyrallides 89
Pyrameis Virginiensis 5
Pyrhocoris apterus 214
Quercus cerris, galls on (with figure) 42
 Ravages, Phylloxerous, in the Cognac district 44
 Rearing *Cidaria immanata* 257
 Recreations of a country doctor 133
 Region, Australian 149
 „ Ethiopian 147
 „ Indian 148
 „ Nearctic 150
 „ Neotropical 149
 „ Palearctic 146
Rhodophæa marmorea 120
 „ *suavella* 120
Rhyparochromus sabulicola 13
Salda fucicola 15
 „ *marginella* 15
 „ *opacula* 15

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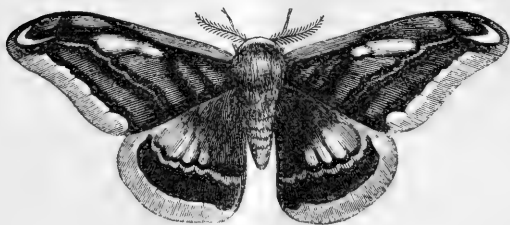
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VARIETY OF SATURNIA CARPINI.

By FREDERICK BOND, F.Z.S.



SATURNIA CARPINI (VARIETY).

THE fine and perhaps unique variety, now figured, of this beautiful species, was bred by Mr. F. Barlow, of Cambridge, from a larva found with many others feeding upon willow on Sawston Fen, Cambridgeshire. In the colour and markings of the specimen there is perhaps nothing worth notice, excepting the absence of the ocellus in each wing, and also of one of the veins in each of the anterior wings. This gives the moth a very remarkable appearance. I was with Mr. Barlow when the larvæ were collected—about fifty in number—and had half of them. I bred from one of them a very curious specimen, a female, which was quite destitute of scales, in fact diaphanous and without markings, though perfect in other respects, and large in size. I gave this specimen to the late Mr. J. F. Stephens, and it is now in the British Museum, in what he called his “metamorphic cabinet.” The rest of the specimens bred were exceedingly fine. I have seven specimens of the brood now in my collection, the largest of which

is a female nearly four inches in expanse. The males are also large, measuring nearly three inches. The markings in all the specimens are very clear and bright, the ground colour rather light, not nearly so dark as some specimens I have from the north of England. I believe all the larvæ found were of the same brood, all being on one large spreading willow, and nearly of the same size.

NEW AND RARE BRITISH LEPIDOPTERA OBSERVED
DURING THE YEARS 1874, 1875, 1876.

By JOHN T. CARRINGTON.

DIVISION I.—MACRO-LEPIDOPTERA.

MANY were the cries of regret when, in an early month of 1874, the "last of the Annuals" appeared. That useful little volume had been conducted by Mr. Stainton with such vigour for twenty years, that we had come to look upon it as an institution, and were selfishly inclined to grumble at its discontinuance; although it had been carried on, I believe, the whole time, at an actual financial loss.

It is difficult to estimate what influence the death of the 'Entomologist's Annual' had upon British Lepidopterists; but, so far as I am aware, there has not been a single Macro-Lepidopteron added to the British fauna since its last issue. I very much doubt whether such a thing has previously happened during any like period in the present century. What is the matter? Where are the Macro-Lepidopterists, who are supposed to outnumber all other entomologists in this country? Perhaps the following reasons may have something to do with the absence of new species.

I have always observed that good seasons produce few novelties; it is the bad years which are really best, when we have to work hard to make a decent show of specimens as autumn comes round. In those unfavourable years we are glad to take anything, like beginners, who have proverbial luck, and pass nothing with—"Oh, it's only that common beast, so-and-so." I reluctantly, but, nevertheless, fear I must, accuse the majority of our Lepidopterists with want of care and observation whilst out collecting. Again,

when our annual holiday comes round we remember where a local species is just out—"Useful for exchange, you know;" so away we go, to devote our whole attention to its capture. No, we never go to an unworked locality, "for fear we shouldn't get any:" therefore we *don't* get additions to our fauna. Someone asks, "Is the fauna exhausted?" How can I believe it is, when there are hundreds of square miles of fine collecting-ground in all three kingdoms where the foot of an entomologist never trod. So far from our having completed the British list of Lepidoptera, there is no reason why additions should not be made to every division, though it be your first love. Where is the new *Erebia*, so long since prophecied from the North of Ireland?

The fashion now seems to be not so much the study of the creatures we take, as that of amassing *big* collections, to be broken up when we are "called over to the majority." These collections have done us no good: they are broken up, sold, again distributed and used for the same purpose by others, who are glad of the chance of "doubling their series." This may be Entomology; but it looks more like acquisitiveness. Moths are, when viewed in this light, perhaps a little better than the "old pots," now the rage; for out of the body of collectors an entomologist may possibly be developed. I cannot see much difference between "collecting," as now followed by so many, insects, china, or postage-stamps; the latter may be best, as one unconsciously learns geography in the process. Do not let us have again to say, "There is no new Macro" in January, 1878; let us rather try to get out of this groove of mere collecting, and more usefully conserve our energies for studying the animals over which we spend so much time.

Although no novelties have been discovered during the past three years, many rare species have turned up. This may not be quite so satisfactory, but is, perhaps, the next best thing; especially where we also know why they were hitherto considered rare. Amongst these are *Zygæna exulans*, *Nola albulalis*, *Eupithecia togata*, *Meliana flummea*, *Nonagria brevilinea*, *Noctua sobrina*, *Pachnobia hyperborea*, *Xylina furcifera*, &c. Most of us now at least possess types of these, while three years ago they were

represented in our collections merely by the label containing their names; especially amongst those of us who prefer waiting, or paying five sovereigns for a *British* example rather than pay threepence in Paris for a type.

The magazines devoted to Entomology have contained the usual amount of reading suited to all parties. The 'Entomologist' has followed its mission of popularising the subject, and thereby gaining recruits; besides sustaining our weaker brethren, who would lose all interest in it without their periodical tonic. The 'Entomologist's Monthly Magazine' is doing very good work as the medium for the collection of descriptions of all the insects in the world, making not unpleasant reading for those interested. The 'Scottish Naturalist,' a quarterly magazine, which ought to be better known, has from time to time had articles of interest not only to Scotch, but to English entomologists. The series of papers in it, entitled "Insecta Scotica," will be of great value for reference when complete. The 'Naturalist' is the organ of several local Natural-History societies: we cannot do better than wish it every prosperity amongst them. With an occasional record in the 'Field,' we have exhausted the serial literature of British Entomology.

I regret, through want of space, this article has had to be divided. The same reason applies to these opening remarks. I should have preferred giving a digest, showing the relative value to the Lepidopterist of each of the three years; but am reluctantly compelled to relinquish the idea after preparation.

The following summary comprises the rarer species of Lepidoptera observed during the past three years. Where the term "visitor" is used, I wish my readers to infer that the subject, though taken in Britain in its perfect state, does not imply that it was introduced in that form. It may have been accidentally brought, in an early stage of development, with exotic plants, or by some other means.

Danaïs Archippus.—Messrs. T. E. Crallan and J. Jenner Weir have written interesting articles (Entom. ix. 265, 267, where the larva is figured) upon the occurrence of this handsome butterfly in Sussex. Mr. J. T. D. Llewelyn also reports its capture from South Wales (E. M. M. xiii. 107). It may become a colonist; time will show.

Pieris Daplidice.—One specimen, taken by Mr. Young, near Southend, August, 1876 (E. M. M. xiii. 108); and one other at Folkestone (Id. xiii. 138).

Argynnis Niobe.—Recorded as British by Mr. Parry and the mythical Mr. Wigan, who were said to have taken a number near Canterbury, in July, 1874 (Entom. vii. 171); the former person again recorded it in 1875 (Id. viii. 183). Mr. Gregson records one as taken at Windermere in 1875 (Id. viii. 82); this is probably a variety of *A. Adippe*, amongst a number of which he took it. This species requires confirmation before admittance into the British fauna.

A. Dia.—An example was undoubtedly taken at Worcester Park, Surrey, in 1872, as recorded by Mr. W. Arnold Lewis (Id. ix. 69). I fear this must be received as only a visitor.

A. Lathonia.—Five, said to have been taken by Mr. Wigan at Broadstairs, September, 1874 (Id. vii. 233); and ten by Mr. Parry, near Canterbury, August, 1874 (Id. vii. 289). The above records must be taken with discretion. One by Mr. Butler, at Hastings (Id. ix. 275). These appear to be all recorded during the three years.

Vanessa Antiopa.—One record only occurs in 1874 (Id. vii. 225); seven were recorded in 1875 (Id. viii.); four in 1876 (Id. ix.). They occurred in the following counties: Hampshire, Gloucester, Surrey, Kent, Essex, Norfolk, Yorkshire, Northumberland, Dumfries, and Antrim.

Pyrameis Virginiensis.—Mr. Bignell reports this interesting foreigner from Plymouth (Id. ix. 255).

Apatura Iris.—Larvæ of (Id. viii. 160, 182). Imagos twice recorded from Kent, July, 1875; fourteen taken in one instance (Id. viii. 219, 291). Twenty-seven taken in Huntingdonshire, 1876 (Id. ix. 230).

Erebia Ligea.—Recorded by Mr. W. J. Mercer as taken by himself at Margate (Id. viii. 198). This seems so improbable that it requires confirmation even as a "visitor." What will next come from the county of Kent?

Lycæna Acis.—From Cardiff comes the welcome news that this scarce butterfly was taken in 1874, again in 1875, and twelve specimens in 1876: twenty-eight specimens in all (Id. viii. 161, 271, *et in litt.*).

Acherontia Atropos.—No example appears in 1874; one only in 1875 (Id. viii. 225), which was taken by a waiter

in the Red Lion Tavern, Westminster: about this there were some amusing lines in 'Punch.' Three are reported in 1876: one from Folkestone (Entom. ix. 276), one from Berwickshire (E. M. M. xii. 188), and the other from Exeter (Id. xiii. 138). We might have thought that this moth was growing scarce again, had I not a manuscript note of its frequent occurrence this year, in larval state, in Cheshire.

Sphinx Convolvuli.—In 1874 we have only two records (Entom. vii.); but in 1876 we have no less than one hundred and ninety examples noted: the 'Entomologist' (vol. viii.) has one hundred and seventy-three records, and the 'Entomologist's Monthly Magazine' (vols. xi., xii.) contains seventeen records. The larva is described in the 'Entomologist' (vol. viii. p. 273). There are only sixteen records in 1876: eight each, in 'Entomologist' (vol. ix.) and 'Entomologist's Monthly Magazine' (vol. xiii.). These were taken in every part of Britain and Ireland, from the Orkneys to Land's End.

S. Pinastri.—Is reported from Harwich, by Mr. Higgins, to the Entomological Society (Entom. vii. 46). I have also two manuscript notes: one from the Eastern Counties, where it was bred; the other from Deal, where it graced a baker's pump! In both these instances good drawings accompanied the record. Still I hesitate to place this species in our British fauna.

Deilephila Galii.—Is twice recorded from Norwich, in 1875—6 (Id. viii. 198, ix. 258).

D. Lineata.—Mr. Evan John reports a single capture of this moth from Glamorgan (E. M. M. xii. 44).

D. Euphorbiæ.—Mr. Higgins says this species was taken in 1872, near Harwich (Entom. vii. 46).

Chærocampa Celerio.—Occurred in Sussex in 1875, and again in 1876 (Id. viii. 53, ix. 231); also at Berwick and Edwinstowe (Id. ix. 276).

C. Nerii.—One captured in a garden in the middle of the town of Lewes, September, 1874 (Id. vii. 290). Taken in a garden at Hemel Hempstead, October, 1876 (E. M. M. xiii. 138).

Sesia chrysidiformis.—Once noticed only in 1874 (Entom. viii. 81). Our readers must not imagine for that reason it has not occurred. I know considerable numbers are each year bred from larvæ found on the South Kent coast.

S. ichneumoniformis.—Taken somewhat commonly by Mr. C. G. Barrett, near Pembroke (E. M. M. xii. 182).

S. muscæformis.—Also found near Pembroke, a new locality, by Mr. Barrett (E. M. M. xiii. 92). This species also occurred commonly on rocks at Plymouth this season (*in litt.*).

S. allantiformis.—This rare moth was taken, July 15th, 1876, near Tring (Entom. ix. 204).

Zygæna exulans.—I had the great pleasure of taking this moth, through the kindness of Dr. White, in its only known British habitat, Braemar, in July, 1875.

Nola centonalis.—Another Kent capture! Wigan (Entom. vii. 205).

N. albulalis.—To Messrs. Farn, Bird, and Porritt, many of us were indebted, in 1874, for examples of the hitherto rare *Albulalis*, when it was turned up in considerable numbers in North Kent (Id. vii. 181). It has since been taken each season, but not in such numbers as in that year (Id. viii. 291, *et in litt.*).

Lithosia quadra.—During July, 1875, this species was of most erratic appearance. Of course it was taken in the New Forest, but also at South Shields, Redcar, and, more strange still, at Askham Bog, near York, where it has never previously been seen, although the locality has been systematically worked for fifty years (Id. viii. 85, 196, and 199).

Deiopeia pulchella.—Ought now to be described as a local rather than a rare moth: eleven were taken in 1874, twenty in 1875, and at least eighteen in 1876 (Id. vii. viii. ix.; E. M. M. xi. xii. xiii.; and 'Field' for those years, &c.).

Callimorpha Hera.—Mr. S. Stevens exhibited, at the Entomological Society, a specimen said to have been captured at Dover (Entom. ix. 263).

Cnethocampa pityocampa.—T. Batchelor, of Southborough, Kent, and W. Peyton, Seal, near Sevenoaks, introduced this species as British (Id. vii. 81). For a time many entomologists believed in their British origin, but I doubt if I could now find one who still does so.

Endromis versicolora.—I captured a fine female at Rannoch, May, 1874.

Epione respertaria.—Recorded (Entom. viii. 280) as taken near Waltham Cross. This I think must be an error, as have

been all other records coming elsewhere than the old locality at York. It is quite possible this species may pass from our Fauna, as the waste ground upon which it occurs may shortly be put into cultivation.

Ennomos Alniaria.—From near Dover is recorded the rearing of two examples of this large Geometer, by the Rev. E. Austin, in 1876 (Entom. ix. 278).

Bolitobia fuliginaria.—This frequenter of dark corners was recorded in 1874 as being taken at Blackfriars Railway Station; a sufficiently dark and dingy locality (Id. vii. 96).

Geometra smaragdaria.—Mr. A. Hodgson reports three specimens from near Sheerness in 1873 (E. M. M. x. 180).

Acidalia contiguaria.—Taken sparingly in North Wales in 1874—5—6, by Mr. Capper. This year has been bred by Mr. Joseph Sidebotham (*in litt.*).

A. degeneraria.—I hear this species has been again taken in its old habitat, Isle of Portland (*in litt.*).

Macaria alternata.—At Christchurch, Hants, one only, 1876 (Entom. viii. 278). Mr. John T. D. Llewelyn took two in 1874 (E. M. M. xi. 158). I hear "this species is not unfrequently taken between Bristol and Exeter" (*in litt.*).

Sterrhia sacraria.—Mr. Llewelyn again reports one female in 1874, from what may be called a head-quarters of this lovely species. More have been taken in his neighbourhood, Neath, I believe, than elsewhere in Britain, (Entom. vii. 260).

Emmelesia teniata.—Mr. Joseph Sidebotham tells me that it was in abundance in a wood near Silverdale, North Lancashire.

E. blandiata.—Mr. H. Jenner-Fust gives a new locality for this species, Glamorganshire (E. M. M. x. 179).

Eupithecia consignata.—Several taken at light in Cambridge; also bred in same town (Entom. viii. 132).

E. extensaria.—A casual visitor from Northern Russia, captured at Hull and reported by Mr. Prest (Id. viii. 109). This has no *locus standi* in the British fauna.

E. subumbrata.—Mr. Hodgson took it frequently near Sheerness in 1873 (E. M. M. x. 180).

E. trisignata (?).—Mr. Prest sends me some specimens for identification, it may be a variety of this species; of this I may have more to say later.

E. Knautiata, Gregson.—Mr. C. S. Gregson described a

moth under this name (Entom. vii. 255). I need scarcely remind my readers that there has been considerable discussion over this species. So far Mr. Gregson seems to have failed to convince the majority of entomologists that this moth is distinct from *E. minutata*.

E. subciliata.—Reported from central Yorkshire by Mr. Porritt (E. M. M. xiii. 108). Also from same locality by Messrs. Prest and Smethurst.

E. togata.—Sir Thomas Moncrieffe, and his assistant, W. Herd, had the good fortune to discover the habits of the larva of this fine moth in 1875. The Rev. H. Harpur Crewe graphically describes it (Entom. viii. 297).

E. debiliata.—Has been taken in some numbers this season near Burnt Wood, in Staffordshire, by two Liverpool collectors.

Melanippe tristata.—The late Mr. Doubleday (Id. viii. 141) points out the probability of the nearly allied *M. lactuata* occurring with this species in Scotland; has any one yet observed it?

Camptogramma fluviata.—Is reported from Limerick, which is, I believe, a new station for this species (Id. viii. 89).

Phibalapteryx lapidata.—I took a fine series of this species at Rannoch in 1875. I hear that it has also been taken this season by two collectors sent to the same locality by Mr. Fry; by Mr. Fetherstonhaugh in West of Ireland in 1875; by Sir Thomas Moncrieffe in Argyleshire in 1875 (*in litt.*).

Cidaria reticulata.—I may almost say has been “rediscovered” by Mr. Hodgkinson in its former habitat, Windermere. It is twenty years since the last had been taken (Entom. ix. 207).

(To be continued.)

NEW AND RARE HEMIPTERA OBSERVED DURING THE YEARS 1874, 1875, 1876.

By F. BUCHANAN WHITE, M.D., F.L.S.

“WHAT’S in a name?” wrote the immortal William: had he been an entomologist of the present day he would have seen cause to change his opinion, and have said that

there was a very great deal in a name. To be termed a "fly-catcher," though perhaps savouring a little of contempt, is not so galling to the thin-skinned entomologist as the title "bug-hunter," or such like opprobrious appellation; and this is perhaps one reason why the *Hemiptera* have never been popular among collectors generally. A more probable reason is that, Hemipterists being few and far between, a beginner does not readily meet with that appreciation of his good fortune (when he has made some notable capture) that a collector of *Lepidoptera* does. For example, if A, being a Lepidopterist, catches a *Catocala fraxini*, then C, D, E, F, and all the rest, can appreciate and envy his good luck; but poor B, a hard-working Hemipterist, may get no end of rarities, and on recording *his* good luck, no shout of admiration is elicited from A, C, D, &c., but merely the query, "What the dickens is *that*?" or the remark, "*That's* only a bug, or something of that kind." Most of us like appreciation, and if a little envy is excited at the same time the value of our *Catocala fraxini* is not diminished in our eyes thereby. Possibly, however, there might be more collectors of *Hemiptera* if the method of collecting and preserving these insects was more generally known. A collector of *Lepidoptera* will have, after a time, got most of the species to be found in his locality, and may be expected, consequently, to have more time to devote to other insects. Let me recommend him then to take up the bugs. There are not too many of them, and they vary so much in colour and structure, and in their natural history, that he cannot fail to be interested in them. And besides he runs a very great chance of distinguishing himself by the discovery of species new to Britain, if not to Science, a bit of excitement which few collectors of British *Lepidoptera* may expect to happen to them.

We will suppose, then, that some collector, glowing with the noble ambition to put on record two bugs where only one was known before, determines, not quite perhaps to throw *Lepidoptera* to the dogs, but at least to include *Hemiptera* in his studies. At first he may find a little difficulty in determining whether certain specimens belong to the *Hemiptera* or not, but an examination of the structure of the mouth will at once show him whether he is right, and he

will soon find that he can easily "spot" a bug when he sees it. It is chiefly with beetles that bugs are likely to be confounded, but when it is remembered that beetles have jaws, and bugs have a rostrum or sucking tube which is hinged at the base and tucked under the breast, there ought to be no difficulty in making out the order.

As regards apparatus. Every collector of *Lepidoptera* is already furnished with the greater part of it. A net for sweeping low herbage, and an umbrella or wide-mouthed net for beating bushes and trees into, is already probably in the possession of every collector. For aquatic species a water net must be made or bought.

To kill and carry his captures, let the collector provide himself with one or more wide-mouthed bottles, such as used by Coleopterists. These may be furnished with cyanide of potassium, secured by plaster of Paris (as in the common killing bottle), and some crumpled pieces of paper or a little sawdust (with the dust sifted out of it), to absorb any moisture from the captured specimens. Or the bottle may be provided with some crushed laurel leaves, or crumpled pieces of paper and a little benzoline. On getting home, the specimens should be turned out and set according to the fancy of the collector. That is to say, he may set them in the British way of setting beetles, viz., fasten them to cardboard with gum tragacanth, setting out the legs and antennæ, and taking care not to mess the specimens; or he may pin the larger beasts, and stick down the smaller ones to cardboard by a *small* drop of (the so-called) "liquid glue," placing the legs and antennæ alongside of the body, but not sticking them down. This is the Continental method, and takes much less time, but the specimens do not look so well as those set well by the first method. Finally, he may name his specimens with the assistance of Messrs. Douglas and Scott's 'British Hemiptera,' published by the Ray Society, or Mr. E. Saunders' more recent 'Synopsis,' just published in the 'Transactions of the Entomological Society.'

I need not say anything to the Coleopterist regarding the localities in which to look for *Hemiptera*, for where he finds beetles he will very frequently find bugs. A few words to the Lepidopterist may, however, not come amiss. Briefly, then, let him beat trees and bushes, sweep low herbage, and

search on the ground among plants. Moss, both from dry and damp places, and dead leaves, &c., may often be sifted with advantage, especially from autumn to spring. Sandy and stony banks of rivers, ponds, and lakes, will furnish him with certain species, and the sea-shore with certain others. A few live under the bark of dead trees, many in marshes, and not a few on or in the water. In a word, let the Hemipterist, who wishes not only to deserve but to attain success, look *everywhere*—from the heart of the crowded city even to the azure plains of mid-ocean, and in both he will find *Hemiptera*.

That a great deal remains to be done in Britain is apparent from the fact that a very few workers have added to the list of British *Hemiptera-Heteroptera* upwards of thirty species between January, 1874, and December, 1876, although a great part of the country remains still unexplored. In fact, with the exception of the London district and part of the south and south-east coasts, the bugs of the rest of the country are either not known at all, or only to a slight degree. Next to the London district, the Tyneside and Cherviot district has been perhaps most worked. Scotland has been examined partially, here and there, but no systematic collecting has been carried on throughout the year in any Scottish locality. Very little indeed has been recorded of the Irish bugs.

May the year 1877 be an "annus mirabilis" in the history of British Hemipterology, in adding many recruits to the small band of Hemipterists, and—what is almost an unavoidable sequence—many species to the British Fauna!

I would take this opportunity of asking for help in the shape of contributions of Exotic *Hemiptera*, especially from countries beyond Europe. As may well be imagined, a very great deal remains to be done amongst the extra-European *Hemiptera*, and very few specimens are collected. If it is found inconvenient to pin or set them, they may be preserved in alcohol, care being taken that the bottles in which they are placed are always full of fluid to avoid breakage of the specimens by shaking. A few pieces of paper, to fill up the empty space in the bottle, will be an additional safeguard.

I now proceed to enumerate the *Hemiptera-Heteroptera* added to the British list since January, 1874. As it is only

within the last few months that the first approach to a full list of the British *Homoptera* has been published, I have not considered it advisable to include them in this enumeration.

Sehirus picipes, Fall. (E. Saunders, E. M. M. xii. 154).—Taken by Dr. Power at Esher and Weybridge; by Mr. Wollaston in Lincolnshire, &c.

Orthostira macrophthalma, Fieb. (Messrs. Douglas and Scott, Id. xi. 173).—Taken under moss on Cheviot, by Mr. J. Hardy.

O. nigrina, Fall.—Doubtfully distinct from the preceding (see E. Saunders' 'Synopsis'). I have taken it in Braemar; and Mr. Champion has also met with it in Scotland.

Scolopostethus ericetorum, Leth. (Messrs. Douglas and Scott, Id. xi. 264).—A common species, but formerly confounded with the closely-allied *S. affinis*, Schill.

Rhyparochromus sabulicola, Thoms. (J. W. Douglas, Id. xi. 266).—Sandhills at Deal.

Peritrechus nubilus, Fall. (J. W. Douglas, Id. xi. 267).—Local. The *P. nubilus* of "British Hemiptera" is *P. puncticeps*, Thoms., and is the common British species, but perhaps merely a variety.

Cymus melanocephalus, Fieb. (E. Saunders, Id. xi. 62).—Chobham, Reigate, and probably elsewhere.

Trapezonotus dispar, Stal. (J. W. Douglas, Id. xii. 222).—Darenth.

Acompocoris alpinus, Reut. (E. Saunders, Id. xii. 249).—Taken at Norwich by Mr. T. P. Dossetor; and Mr. Douglas and I found it at Dunkeld last August.

Lopus sulcatus, Fieb. (E. Saunders, Id. xii. 186).—Portsmouth, &c.

Macrocoleus tanaceti, Fall. (E. Saunders, Id. xii. 131).—On tansy at Chobham.

Pilophorus clavatus, L. (Messrs. Douglas and Scott, Id. xii. 100).—On willow in August, at Lee, &c.

P. perplexus, D. and S.—A new species described by Messrs. Douglas and Scott (Id. xii. 101), and found by them on bushes, near nests of *Formica rufa*, in July and August. Mr. Saunders ('Synopsis,' p. 287) thinks this is *P. bifasciatus*, F.

Phytocoris pini, Kirschb. (F. Buchanan White, Scot. Nat. ii. 63; Messrs. Douglas and Scott, E. M. M. xi. 144).—First

taken in Braemar. I met with it afterwards in Rannoch and elsewhere; Mr. Douglas and Dr. Reuter have also taken it; and it appears to be common enough in North Scotland on Scots-fir.

Litosoma Douglassi, E. Saunders.—A new species described by Mr. Saunders (E. M. M. xi. 63), and found at Woking on broom.

Allocotus rubidus, Put., var. *Moncreaffi*, D. and S. (Messrs. Douglas and Scott, Id. xi. 146).—A variety of a species and genus new to Britain; taken by the indefatigable Mr. Moncreaff, at Portsmouth. Mr. Saunders ('Synopsis,' p. 294) records both the type and the variety from Woking.

Psallus diminutus, Kirschb. (O. M. Reuter, Id. xiii. 86).—Taken by Messrs. Reuter and Norman on oaks, at Forres. It is common at Perth; and I have specimens from the London district, taken by Dr. Power; so that it is probably common throughout the country, but had escaped identification till detected by Dr. Reuter.*

Plesiodesma pinetellum, Zett. (O. M. Reuter, Id. xiii. 85).—Taken by Dr. Reuter on Scots-fir, on Moncreiffe Hill, near Perth. Dr. Reuter showed me these specimens, and subsequently I found it locally common on Kinnoull Hill, near Perth. Mr. Champion has also met with it near Aviemore; so that it is probably not uncommon.

Myrmedobia tenella, Zett. (E. Saunders, Id. xii. 249).—Taken in various places near London, by Messrs. Power and Saunders.

Piezostethus formicetorum, Boh. (F. Buchanan White, Scot. Nat. i. 260; Messrs. Douglas and Scott, E. M. M. xi. 174).—In nests of *Formica rufa*, in Braemar.

Temnostethus nigricornis, Zett. (O. M. Reuter, E. M. M. xiii. 86).—A single specimen taken on Scots-fir, on Moncreiffe Hill, near Perth, by Dr. Reuter. I have taken one on Kinnoull Hill.

Nabis Poweri, E. Saunders.—A new species described by Mr. Saunders (Id. xii. 250). Taken among rushes, at Chobham.

* *Psallus Whitei*, D. and S., though considered by Mr. Saunders ('Synopsis,' p. 302) and others as a variety of *P. variabilis*, Fall., is not unlikely to prove a good species. Dr. Reuter met with it during his visit to Scotland last summer.

N. rugosus, L. (J. W. Douglas, E. M. M. xii. 154).—Lee and Darenth. Probably common in many places.

Salda pallipes, F. (J. W. Douglas, Id. xii. 30).—Hayling Island; Mr. Moncreaff.

S. pilosella, Thoms. (J. W. Douglas, *loc. cit.*).—Common on the coast.

S. opacula, Zett. (J. W. Douglas, E. M. M. xi. 9).—Taken by myself on marshy ground, at about two thousand feet altitude, in Braemar.

S. palustris, Douglas (J. W. Douglas, *loc. cit.* 10).—Southampton, &c.

S. vestita, Douglas (J. W. Douglas, *loc. cit.* 11).—Taken by Dr. Power, at Loch Leven; and by Mr. Hardy, on Tyneside.

S. marginella, Fieb. (J. W. Douglas, *loc. cit.* 142).—Deal.

S. fucicola, J. Sahlb. (J. W. Douglas, *loc. cit.* 143).—Folkestone, &c. Dr. Reuter met with it in the north of Scotland last summer.

Hydrometra aspera, Fieb. (J. W. Douglas, E. M. M. xii. 223).—Taken in Fifeshire, by Dr. Power.

Corixa prominula, Thoms. (J. W. Douglas, *loc. cit.* 224).—Taken in the Hebrides, by Mr. H. Jenner-Fust.

A FEW DAYS IN THE NORFOLK FENS.

By W. H. TUGWELL.

Now that the busy season of collecting is over, save to the diligent pupa-digger, I feel certain that a large majority of the readers of the 'Entomologist' would be glad to see in its pages more frequent notices of local jottings and excursions, as much pleasant reading and at times real information may be picked out of them, to be put into practice on our future trips; so I hope the following account of one of my expeditions may interest some, and tempt other and more experienced entomologists to give us from time to time a few leaves from their journals.

I have for years wished to see and have a little fen collecting,—to invade the native habitat of *Papilio Machaon* in its moist retreat. On July 25th, 1876, I started to realise my desire, and to spend a week at Ranworth Fen. To reach

this place is by no means easy, as it lies out of the main track of any conveyance, between Norwich and Yarmouth, and the nearest point to any railway station being at Brundall, some seven miles distant. I determined to try this route, and risk getting a conveyance of some kind to carry my luggage. Fortunately I found at the station a farmer's cart in waiting, which was going to South Walsham, only a mile from Ranworth. Thence I walked on to the "Jolly Maltsters," where I hoped to be able to find apartments, and to assuage a pretty considerable thirst, created by a blazing July sun, which, after some trouble, I did. I found that I was, as expected, the only visitor in the place. Thus far all had gone well. On reaching the house I had noticed a nice lot of young fowls running about, and cruelly conceived the idea of spitting a couple of them. The landlady consented to do the deed, and to roast them for a five o'clock dinner. Were I inclined to be superstitious, I might perhaps attribute my want of success on this occasion, not, like Coleridge's "ancient mariner," to the killing of the albatross, but to my *fowl* plot.

I started at once to reconnoitre my hunting-ground, or it would be almost more correct to say, hunting-water. A few yards from the house is Ranworth Broad and, opposite or across it, Ranworth Marsh. Possibly many, like myself when I went, have little idea what this fenny country is like; it may not be amiss to briefly describe it. The district here for miles is one extensive flat, through which run small and sluggish streams, on either side of them are thousands of acres of marshy ground, with here and there large open pieces of water, called Broad. Ranworth Broad is about a quarter of a mile long, varying in width from one hundred to two hundred yards: it has a deep belt of reeds and rank vegetation all round the margin, whilst jutting out into the water, and also growing in the middle of it are beds and tufts of *Typha angustifolia*, *T. latifolia*, *Scirpus lacustris*, &c. On the marsh opposite there are thousands of acres of rough, rank herbage, composed of smaller species of reed, meadow-sweet (*Spiræa Ulmaria*), *Valeriana officinalis*, two or three species of willow-herb (*Epilobium*), *Cariceæ*, several of the *Juncaceæ*, or rush family, with a carpet of moss, and marsh-fern (*Lastrea Thelypteris*), also several coarse grasses;

forming together a crop that is annually cut for fodder. The ground is very wet and deceptive, as I afterwards found out to my discomfort. The white and yellow water-lilies look very beautiful on the water; and in the ditches the curious water-soldier (*Stratiotes aloides*), with its prickly-edged leaves, strikes the eye of the visitor. I took a boat out into the Broad, and commenced operations by splitting open the stems of *Typha*, &c., hoping to find the pupa of *Nonagria brevilinea*, which was the principal object of my visit; but after three hours' hard work was forced to conclude that I had not hit on the right plan of action. I found many traces of frass in the stems, but no pupa; and was much puzzled to think where the larvæ had gone to change to pupæ.

While dining, about a cart-load of *Typha* and bullrushes were brought in for basket-making, so I thought that a good chance for a search. I found a pupa almost at once, which augured success; but although I searched the remainder, and the next day went through two hundred bundles more, I did not find another pupa. Unfortunately this one died, so I did not make certain of its species: it was in a *Scirpus* stem.

After dinner I prepared for my first night experience of fen work. Having pulled a boat across the Broad into a ditch overgrown with tall reeds and the two species of *Typha*, I with no small difficulty forced my way up it by means of a punting pole. These ditches would be ugly places to fall into, as in many places they are six to eight feet deep in mud of the consistency of cream, smelling abominably on being disturbed; so I took a dose of quinine and brandy, which I had brought, thinking it might be useful to prevent fever or ague. I then tied up my boat to the bank of the ditch, near an "alder car," where the ground was tolerably firm. I had been advised to search the honeydewed leaves of alder and willow for *Noctuæ*, but on inspection no honeydew was to be seen, so I applied a little sugar to the leaves instead, and on all the available trees and bushes: I then commenced mothing. *Epione apiciaria* was common, but worn; *Abraxas grossulariata* swarmed in hundreds along the edge of the "car;" *Lithosia muscerda* was more sparing in numbers; *L. griseola* common, with a few examples of its variety *Stramineola*; *Nudaria senex*; *Nonagria despecta* flew in plenty, but were mostly worn; a single specimen of

Crambus adipellus fell to my net; *C. uliginosellus* was very common, but entirely worn out,—useless for cabinet specimens; and one fine male *Geometra papilionaria*. Visiting my sugared leaves I found plenty of moths, but all common; the only species new to me, alive, was *Celæna Haworthii*,—two specimens were duly bottled, with a lot of *Leucanidæ*, &c., for morning's inspection; three larvæ of *Simyra venosa* were found on the reeds. As time went on, and moths got more and more scarce, one could realise the solitude,—alone on this boggy fen; and to improve it I dropped suddenly into a water-hole up to my thighs, thus putting out my lamp. Scrambling out as quickly as possible, and squeezing out some of the superfluous moisture, I re-lighted my lamp, and took a short pull at the brandy-flask and a long one at my pipe, from which I got much comfort. Looking at my watch I found it was two a.m., so determined to make for the "Jolly Maltsters." Getting into the boat, I pushed my way back to the Broad. In returning along the ditch I took a few specimens of *Crambus paludellus*, one of which is of a beautiful pure white colour, with spots of black,—in fact as white as *Myelophila cribrella*, one specimen of *Herminia cribralis*, three *Schænobius Mucronellus*, and a lot of *Chilo Phragmitellus*. Once on the Broad I found it was not so easy to get home as I imagined; it being still dark it was difficult to hit on the landing-place. However, I got safely to bank. Here hundreds of *Acentropus niveus* were disporting themselves over the water, flying close to, and even settling on, its surface, rising from it again with the greatest ease. It was three o'clock when I reached the house,—pretty wet, of course; but after a good wash and dry rubbing I turned into bed, and was soon fast asleep. The morning examination of captures proved my night's conjectures: only very common species had rewarded my pains. My other nights were pretty much a repetition of my first; the only addition worth notice being a nice dark specimen of *Acronycta leporina*.

The day work was singularly dull,—very little was to be done in the way of captures. I was much pleased to get a few splendid larvæ of *Papilio Machaon*: this grand species appears common here, although this season not so plentiful as in former years. According to the men who work on the

marshes, the local name for the caterpillars here is "canker," or "canker-worm." The larvæ of *Saturnia carpini* and *Chærocampa Elpenor* could be got in plenty by working for them. The flower-heads of Valerian produced *Eupithecia viminata*.

I left Ranworth with very few insects on my setting-boards, and made the following "mem." for future trips:—"Not to go alone; and to have a strong attracting light." This is a most necessary thing for fen working. Probably the great floods that occurred in 1875—just at the time *N. brevilinea* was out, and when the females ought to have deposited their eggs—accounts for my want of success in taking it this season. The men working on the marsh told me that for two or three weeks the marshes were flooded to a great height. At any rate, this year, this insect hardly appeared at all; I only heard of a solitary example being secured, and that a worn one.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

LYCÆNA ACIS.—My friend E. P. Breaks and I had the good fortune to capture a dozen specimens of this butterfly, near Cardiff in 1876: they were flying in company with the common blues in June last.—JAMES E. HEATH; Cardiff.

PUPA OF SPHINX CONVULVULI IN THANET.—There have been several notices this autumn of the capture of *S. Convolvuli*, so I conclude it will interest some of your readers to hear that the pupa was dug up in a garden at Birchington, in Thanet, the 17th or 18th of October. It was found by a boy digging potatoes, and sent to me for *Acherontia Atropos*, but there is no doubt about its being *Convolvuli*, from the exaggerated likeness which it bears to *S. Ligustri*; the curved, annulated tube containing the proboscis, measuring nearly an inch and a quarter in length; the pupa is not more than two and a half inches long. Last year, in this same village, the imago abounded, as many as sixty being taken in one garden, whilst this year there were but five: it is a place where one might reasonably expect to find the larva but for the rigid farming, which abhors a hedge and has no pity on the wayside flowers. Possibly the eggs may have hatched frequently

in these parts, and the larvæ perished through the uprooting of the food-plant, before they could come to maturity; I think we may assume this, after the abundance of the imago in 1875. The pupa was a light brown when I received it, and has darkened since; probably when found it had but just changed. Wild convolvulus grew amongst the potatoes where it was found.—H. M. GOLDING BIRD; 45, Elgin Crescent, Kensington Park, November 20, 1876.

NOTE ON THE LARVA OF *POLIA XANTHOMISTA* var. *NIGROCINCTA*.—On the 8th of September, 1875, I visited my breeding cages as usual about six p.m.; I then observed a male *P. nigrocincta* sitting upon the side of the cage. A short time afterwards I again looked, and then found a female in the act of coming out of pupa; I left them in company, which resulted in copulation at about ten o'clock the same evening. After disunion I kept the female; she was very sluggish in her habits: during the day she sat perfectly quiet upon a suitable place of nearly her own colour. On the third night afterwards she deposited her first eggs, about a dozen in number; again, the following night, she laid about a dozen more, and on the sixth night she completed her oviposition, having laid on this occasion 208 eggs during the night. She still lived for several days, but eventually died without laying more eggs. The eggs were pale pink in colour for about three days, when they slowly changed to dirty brown: they remained of this shade until the early part of April of this year, when they became a dark lead-colour, and finally hatched upon the 20th of April. I had previously prepared some young plants of *Plantago maritima*, in flower-pots, for the use of these young larvæ. Without eating their own egg-shells they at once commenced feeding upon the plantain, and fed well until about fourteen days later, when they began to show signs of changing their first skins: this was completed during the next three days, when they again began to feed vigorously. During their first days of active life these larvæ were almost devoid of colour, being so transparent that they were easily overlooked, though in numbers, upon a small plant. However, they soon began to assimilate to the colour of the narrow leaves of the plantain, and were always difficult to identify, from their great resemblance to the stalks of the food-plant. There was very little

variation in intensity of colour, some few only being slightly lighter than their neighbours. The second change began about twenty-eight days after their birth, and was carried through with ease and perfect health. About this time I went for my annual holiday to the Isle of Man, leaving the larvæ feeding well upon growing plants, in six large flower-pots, in which they had plenty of room, and were in the open air, simply covered with muslin. On my return, on the 21st of June, from the island, to my disgust I found large numbers dead, and others dying; this was during what, I expect, was their last change of skin. Removing the dead ones, and otherwise contributing to the comfort of the remaining strong ones, I hoped to save them; but no, they still died, until my last disappeared. The effect was most peculiar, for there was nothing left but loose skins; they seemed to have had something akin to diarrhœa. Of the seven larvæ of the same species I brought from the island, which I fed separately on food from their native locality, I reared four perfect specimens. In other years I have found the same affliction attend young larvæ of *P. nigrocincta*, found in a state of nature. We can only estimate the quantity we shall rear when we get the larva in its last stage, and when it is brown in colour. My chief object in sending these notes to the 'Entomologist' is that they may settle the question of whether or no the larva hybernates. It has been stated that such is the case. This is now proved not to be so. Another season I hope to succeed in rearing this species from the egg to its perfect state.—JAMES LEATHER; Manor Road, Liscard, Birkenhead.

CAPTURES AT WITHERSLACK.—On the 21st of July Mr. Hodgkinson and I went to Witherslack in the finest possible weather, after a long spell of drought. We expected to find a rich harvest of Lepidoptera under such seemingly favourable conditions; but what naturalist could ever truly foretell his success or failure under apparently desirable or adverse circumstances. We did not, as in former years, find anything approaching the vast variety of either Macro- or Micro-Lepidoptera, that flying or at rest absolutely bewildered the eager collector. During the day a hot sun beating down on the parched ground forced everything, except ourselves, to seek shelter; while at night, where the eye could command

yards of heather at a glance, nothing but hordes of gnats and, more terrible, "midges" were visible. Respecting these "midges," I should like to know their scientific name,* which, if in accordance with their habits, must be of terrible significance: blood they will have; even tobacco-smoke being a questionable remedy. The best way to avoid their attentions is to apply neat whiskey constantly to the face and neck with a handkerchief. Comparatively scanty, however, as were the results of the journey, we obtained the real object of the visit, viz. a few *Elachista serricornella*: about sixteen were obtained by very assiduously sweeping a small reddish *Carex* growing in wet places on the peat, five of which fell to my share. The man who gets this insect deserves it, for truly no more heart-breaking pursuit can be imagined. Amongst deep heather—on very rough ground, which here and there becomes wet bog—we swept for hours, with nothing to divert our attention, as, excepting the "midges" and hosts of migrating winged ants, few insects inhabit the same locality as *Serricornella*. *Schrankia turfosalis*, *Crambus margaritellus*, and *Pterophorus Bertrami*, were taken at the same time, along with *Coleophora therinella*. At the plantation the beautiful longhorn, *Nemotois minimella*, was to be found sparingly, about three dozens falling to our joint efforts. In company with it was *Gelechia senectella* and *G. similella*, *Dicrorampha consortana* and *D. acuminatana*, with the "pearl" *Rivula sericealis*, &c. One morning was spent on some broken ground, covered with small rocks, where *Cnephasia penziana*, *Ennychia cingulalis*, *Herbula cespitalis*, *Crambus pinetellus*, and *Elachista dispunctella*, occur. Some green Tortrix larvæ were found in seeds and leaves of columbine (*Aquilegia vulgaris*), from which we have since bred *Cnephasia lepidana*, although we believe these larvæ only crept into the seeds to change to the pupa state; and, as many pupæ are still alive amongst the dried plants, we expect something else to turn out in spring. A *Coleophora*, with a long, bent, brownish case, found on birch (possibly *C. Wilkinsonella*), and a minute *Elachista*, still puzzle us: the latter is assignable

* The "midges," there can be little doubt, were a species of *Culex*,—veritable mosquitos,—probably *Culex detritus*, which is on the wing during the day, frequently in multitudes, as is also *C. annulatus*.—F. S.

to no known species. In the woods at Grange there were plenty of larvæ of *Nepticula arcuosella* feeding in wild strawberry, and of *N. splendidissimella* in bramble (a more slender and tortuous mine than *N. aurella*); also *N. septembrella*, in its most intricate and almost blotch-like mine, was found in leaves of St. John's-wort. Thus ended a most pleasant trip of three days, which we hope many times to repeat next year.—J. H. THRELFALL; Preston, November 17, 1876.

NOTE ON ORTHOTÆNIA ANTIQUANA.—About the end of April, 1876, when digging in the garden, I noticed the roots of *Stachys palustris* very much swollen. Breaking one or two across, I found they were mined by a small white larva; I kept several of them in a tin box, where they remained until they were full fed: this was about the end of May. Then they came up to the lid of the box, where one of them spun a whitish web, but not finding it to their taste they all went down again among the roots, some spinning among the roots, others sealing up the end of the mine in the roots with silk. The perfect insects came out in June. I fancy the moth will lay its eggs in June or July, and the young caterpillar will mine down the stem into the roots, wounding it and causing a partial thickening, in the same way as *Pterophorus microdactylus* wounds the stem of hemp agrimony; it must feed slowly during the winter months, as it is late in spring before they are fed up. Merrin gives *S. arvensis* as its food-plant, but *S. arvensis* is an annual, and is a seed all the time the larva of *O. antiquana* is feeding.—W. SHAW; Eyemouth Mill, Ayton, Berwickshire, December, 1876.

NOTES ON SOME OF THE GENUS DICRORAMPHA.—Last Easter, when at Witherslack, I collected a good number of the young shoots of the ox-eye daisy (*Chrysanthemum*), then about three inches long; I picked those only that were twisted, feeling sure that the larva was lower down in the root. I have known for years, and have bred nearly all of this genus before, that there are certainly three species from ox-eye, viz., *D. plumbagana*, *D. acuminatana*, and *D. consortana*. The habits of the two former species are similar, and have a continuity of broods. I have bred *D. acuminatana* from the middle of May until the end of August, all appearing from larva collected from the beginning of April until the

middle of May. The only difference in the feeding of the larva and the time is with *D. consortana*: the larva of this species is quite six weeks later, say the first week in June, when the ox-eyes are about nine inches high: then by the distorted shape of the stem you may readily find the larva near the top of the plant, and it is only single-brooded, appearing not earlier than the first week in July. I have noted where only small patches of ox-eye grow on the sea-bank, near Fleetwood, all of the three species occur, and I never find them anywhere else. I have taken and bred some scores this season of all these. As to *D. herbosana* I found it where there are no ox-eyes growing—at least, only odd plants—this season, on the road-side, near the inn at Witherslack. I may say, that while the former species abounded, I could only take a score of *D. herbosana* about six o'clock on a fine evening, on the bare road-side. Still, the wind might have blown them out of the fields, no great distance off, and the setting sun just made them active in this particular spot. *D. plumbagana* is a rarer species down here; I am not quite sure whether it occurs at all. I have specimens of my own setting, but cannot remember where I captured them.—J. B. HODGKINSON; Preston.

NEMATUS RIBESII (VENTRICOSUS) AND N. CONSOBRINUS.—Dr. Snellen van Vollenhoven finds the larva of the former species on "currant," and that of the latter on "gooseberry" (Entom. ix. 247); with me, the larvæ of both insects feed on both plants.—J. E. FLETCHER; Pitmaston Road, Worcester.

ANSWERS TO CORRESPONDENTS.

A. W. ROSLING.—NAME OF BEETLE.—Would you kindly name the beetle, which I have tried to draw? It is black, and punctured almost all over. It was taken by a young friend of mine, near Southampton.

[From the description, the insect is, I think, an *Onthophagus*, probably *O. ovatus*; but it may possibly be a much rarer thing, *Odontæus mobilicornis*. I cannot tell for certain without seeing it.—JOHN A. POWER.]

H. H. CORBETT.—We cannot undertake to name the *Eupitheciæ* without seeing them.—ED.

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THE OCCURRENCE OF MELITÆA DIDYMA IN THE SOUTH OF SCOTLAND.

By J. JENNER WEIR, F.L.S., F.Z.S.



MELITÆA DIDYMA.

It has been a matter of surprise to me that so few species of the genus *Melitæa* are known to be indigenous to the British Isles. Mr. Kirby, in his 'Manual of European Butterflies,' gives a list of sixteen found within the limits of Europe: of these but three have been detected in this country. All are gregarious in their habits and extremely local in their distribution, so much so that but few Lepidopterists have taken all three of them, although in the localities frequented they are usually found in considerable plenty.

Mr. W. Lennon, of the Crichton Royal Institution, Dumfries, has sent to the Editors of this magazine a specimen of *Melitæa Didyma*, which he states he captured some years ago within a few miles of Dumfries, in company with *Argynnis Euphrosyne* and *Selene*, which on the day of the capture, to use his own words, were in "such swarms" as he had never before witnessed. He at the time considered the insect a fine variety of one of the two species

mentioned; and having since paid more attention to *Coleoptera* he had not made a proper examination of the specimen. Lately he has again devoted himself to the study of the *Lepidoptera* of his district; and upon more carefully examining the specimen in question he observed that it was totally different from anything he had previously noticed, and therefore forwarded it to London for identification. He states that he captured the insect in the neighbourhood of woods, composed of Scotch fir, birch, and hazel; and that in the exact spot of its capture was a plentiful growth of sweet gale, blackberries, and *Vaccinia*. The larva of the insect feeds on *Artemisia*, *Centaurea*, *Linaria*, *Teucrium*, *Plantago*, *Veronica*, and *Stachys*.

The specimen is a male, apparently but just emerged from the chrysalis, with the right wings in a somewhat crumpled state.

Melitæa Didyma is of wide distribution on the Continent, being found in Russia, France, Germany, Switzerland, Italy, and Spain. I have specimens of the insect in my cabinet from Poltawa and Kief, and have taken it myself in the Alps. The Scotch specimen is very closely similar to a male which I captured in Switzerland, a few hundred feet above the English church at Zermatt, and partakes more of the usual appearance of the insect from alpine districts than those found in lower grounds.

This species of *Melitæa* is an ally of *Cinxia*: like that insect the under side of the hind wings has large, black, basal spots. Staudinger states that the insect is "*valde varians et aberrans*." The male has the wings on the upper side of a bright reddish fulvous; fore wings with a row of black spots on the hind margin, and another in the centre, and several other black spots; hind wings with a marginal row of black spots, and other indistinct scattered black markings: under side—fore wings pale fulvous, with similar markings to those on the upper side, tip straw-colour, fringes spotted with black; hind wings straw-colour, with two distinct reddish bands separated with rows of black spots, fringes spotted with black. The female has all these colours and markings more subdued, and the fulvous suffused with fuscous: in alpine varieties the black is slightly tinged with greenish.

The neighbourhood of the Solway Firth, where this insect

was captured, enjoys a very mild climate, and is well sheltered from the north by the Cheviots. The insect appears on the wing early in July, and in mountainous districts as late as the middle of August.

Mr. Lennon proposes to make a further search this year for the insect, and I have little doubt will succeed in establishing its claim to be considered a British species.

The figure represents the upper side of the specimen, taken Mr. Lennon in Scotland, although it has not been thought necessary to depict the crumpled wings.

NEW AND RARE BRITISH GALL-PRODUCERS OBSERVED SINCE THE YEAR 1872.

By EDWARD A. FITCH.

THE following additions may be made to Müller's list, which appeared in the 'Annual' for 1872. Some remarks were made thereon by Rev. T. A. Marshall, in the volume for 1874 (Annual, pp. 115—117). The arrangement accords with that in the above-mentioned catalogue, to which this forms a supplement.

CYNIPIDÆ.

Dryophanta scutellaris, Oliv.—Our well-known cherry-galls belong to this species, and not to *D. folii*, L. (Entom. ix. 121).

Aphilothrix solitaria, Fonsc. (= *ferruginea*, H.) (Entom. viii. 169).—In addition to the localities given in the 'Entomologist,' this gall has occurred in Middlesex, Surrey, and Essex. It is no doubt generally distributed.

A. globuli, H. (Entom. viii. 254).

A. autumnalis, H. (Entom. viii. 255; E. M. M. xii. 226).—I have now learned to differentiate satisfactorily this and the preceding species, both of which occur in oak-buds in the autumn. Mayr's descriptions are found to be excellent, when the two galls are compared. Recorded from Perthshire (P. Cameron).

A. collaris, H. (Entom. viii. 289).—The galls described by Schlechtendal (Ent. Zeit. xxxi. 396, 397), under the names *Cynips tegmentorum* and *C. fasciata*, belong to this species.

A. albopunctata, Schl. (E. M. M. xi. 110).—This species

is widely distributed in England, but I have no record further.

A. callidoma, H. (Entom. viii. 290).—I now find this rather variable gall in some abundance in the autumn; such is also the case in the neighbourhood of Nottingham (G. B. Rothera) and Isleworth (E. A. Ormerod).

A. glandulæ, H. (Entom. ix. 1).

Cynips Kollari, H.—Our common British oak-nut is the produce of this species. *Lignicola* is not known as indigenous, but there is no reason why it should not occur (Entom. vii. 241, 265).

Neuroterus laeviusculus, Schenck. (= *pezizæformis*, Schl.).—The galls of this species have been recognised in Middlesex and Surrey (E. A. Ormerod), Essex (E. A. Fitch), and Nottinghamshire (G. B. Rothera).

Andricus testaceipes, H. (= ? *A. noduli*, H.) (Entom. ix. 219).

A. æstivalis, Gir. (E. M. M. xii. 226).—The gall has not been found. Mr. Cameron took an *Andricus*, near Loch Lomond, in May, which is doubtfully referable to this species.

A. amenti, Gir. (E. M. M. x. 85, and Scot. Nat. ii. 171).

A. quadrilineatus, H. (E. M. M. x. 39, and Scot. Nat. ii. 170).—I have found the galls of this species on several occasions in Essex.

A. glandium, Gir. (E. M. M. xii. 83).

A. terminalis, Fab.—The maker of the common oak-apple is not generically distinct from *Andricus*.

A. trilineatus, H.—I bred this species abundantly from the cupule of *A. gemmæ* galls. An inquiline.

Spathegaster vesicatrix, Schl. (E. M. M. x. 85, and Scot. Nat. ii. 171).—Also occurs at Isleworth (E. A. Ormerod) and Maldon (E. A. Fitch).

S. aprilinus, Gir. (Entom. ix. 76).

TENTHREDINIDÆ.

Nematus cinereæ, Retz., Thoms. (E. M. M. x. 278).—"From hairy pea-shaped galls on *Salix cinerea*." P. Cameron (*l. c.*). It is not stated how the galls of this species differ from those of *N. pedunculi*, H. Are the species synonymous?

Nematus baccarum, Cameron (E. M. M. xii. 189).—"From berry-shaped gall of a grayish green colour, covered closely with fine white hairs, on the leaf of a willow—near *S. aurita*." (l. c.).

N. crassipes, Thoms., var. *Vacciniellus*, Cameron (E. M. M. xii. 190).—"Bred from galls on *Vaccinium Vitis-Idæa*" (l. c.).

N. viminalis, L. (= *intercus*, Pz. = *gallarum*, De Geer, H.).—I have bred *Nemati* which I believe are referable to the above species from the round, smooth, rosy galls which are found on the midrib of the bitter (*Salix monandra*), and probably other closely-allied willows, kindly sent me in some numbers from Yorkshire by Mr. Inchbald, who writes me—"The gall of the bitter willow, Cameron writes me word, is produced by *Nematus cinereæ*, of Retz—a common enough species." There is surely some confusion here; see above for Cameron's description of that gall. *Viminalis* galls are first noticeable in June; the larva is full fed and leaves the gall in August, and I have bred the sawflies in the first fortnight of June (Life-history, see 'Zoologist,' 1863, p. 8473).

N. Vollenhoveni, Cameron (Scot. Nat. ii. 296, Life-history and description).—From galls resembling those of the former species on *Salix purpurea*.

N. crassulus, Dahlb.—"Not uncommon on the banks of the burn at Camachgouran: according to Thomson *N. crassulus* is a gall-maker." P. Cameron (Scot. Nat. ii. 358).*

CHALCIDIDÆ.

Eurytoma hyalipennis, Wlk. (= *afra*, Boh. = ? *graminicola*, Gir.) (Entom. v. 239, 264).—This Chalcid is the producer of galls on *Ammophila arenaria* and *Triticum repens*; at least I have failed to differentiate the species bred from the galls on the sea reed, sent me in numbers by Mr. Inchbald, and those from the twitch, which I find commonly in Essex. The galls, which are generally distributed (Scot. Nat. i. 195), consist of imbricated buds on the principal stalk, and are easily seen and collected in their dry state in the winter: I have bred the flies in June and July.

E. depressa, Wlk. (Entom. v. 239, 451).—From galls on the stems of *Festuca ovina*; flies bred May and June

* Van Vollenhoven has just given us the life-history of this species—which is not a gall-maker—in the 'Tijdschrift' (vol. xix. p. 264).

(Moncreaff). The life-histories of the *Eurytomidæ* are still very obscure.

CECIDOMYIDÆ.

Cecidomyia trifolii, F. Löw. (Scot. Nat. i. 195).—In galled leaflet of *Trifolium repens* and *pratense*. Metamorphosis internal.

C. serotina, Winnertz. (Scot. Nat. ii. 31, 172).—Gall in the terminal bud of *Hypericum pulchrum*.

C. rosæ, Bremi (Scot. Nat. i. 124).—Pseudo-gall on the leaflets of *Rosa canina* and *R. villosa*; generally distributed.

C. Giraudi, Frauenfeld (Scot. Nat. ii. 78).—In galled leaflet of *Astragalus hypoglottis*. Metamorphosis external.

C. Onobrychis, Bremi (Scot. Nat. ii. 78).—Pseudo-gall very like the preceding, but larger on *Vicia cracca*. It also occurs on *Onobrychis sativa*, and probably other allied species.

C. Lathyri, Frauenfeld (Scot. Nat. ii. 78).—In deformed leaflet of *Lathyrus pratensis*, resembling the pseudo-galls of the two previous species. Metamorphosis internal.

C. Pruni, Kalt—Undescribed. In boat-shaped pouches on the mid- and side-ribs (rarely on the edge of the leaf) of sloe (*Prunus spinosa*) leaves; very common in Essex in June. I have been unsuccessful in breeding the gall-gnats, but a *Callimome* has emerged in some numbers. Metamorphosis external.

Diplosis tremulæ, Winnertz. (Scot. Nat. ii. 253).—In smooth, pea-like, but variable galls on the twigs and petioles of *Populus tremula*. Metamorphosis internal. Kaltenbach gives this species as synonymous with *C. polymorpha*, Bremi.

Asphondylia pimpinellæ, F. Löw. (gall = *C. pericarpiicola*, Bremi = *C. pimpinellæ*, H. Löw.) (Scot. Nat. i. 125).—In galled seeds of *Pimpinella saxifraga*, one larva in a gall; it also occurs on *Daucus carota* and *Pastinaca sativa*. These galls were known to Curtis ('Farm Insects,' p. 416): it was from them that he bred his *Callimome Dauci*. Metamorphosis external.

Asphondylia ulicis, Traill (undescribed) (Scot. Nat. ii. 172).—In galled flower-buds of *Ulex Europæus*.

? *Hormomyia Fischeri*, Frauenfeld (Proc. Ent. Soc. 1871. p. x.; see Entom. v. 298).—The galls on the leaves of *Carex* (*l. c.*) were probably produced by this species.

Urophora solstitialis, L. (Entom. vi. 142).—In galled flower-heads of *Centaurea nigra*, generally distributed.

Trypeta signata, Meig. (Entom. v. 450).—In the enlarged and aborted receptacle of *Inula crithmoides*. The specific determination of this species is very probably erroneous.

? *Trypeta Serpylli*, Kirchner (Scot. Nat. ii. 252).—In galled flower-heads of *Thymus Serpyllum*.

The above list does not include the very numerous mite-galls (*Phytoptus*, Duj.), and the genus *Aulax* is best left as in the 'Annual,' although it needs some revision.

NEW AND RARE BRITISH LEPIDOPTERA OBSERVED DURING THE YEARS 1874, 1875, 1876.

By JOHN T. CARRINGTON.

DIVISION I.—MACRO-LEPIDOPTERA.

(Continued from p. 9.)

Platypteryx sicula.—Five examples are recorded in the 'Entomologist' (vii. 179). These were taken by Messrs. Grigg, Hudd and another, in June, 1874. I hear more have since been taken, but not recorded.

Petasia nubeculosa.—A fine example of this moth was taken at Rannoch last April by Mr. Duncan Robertson, of Camghouran.

Acronycta Alni.—Ten were taken in 1874, three in 1875, and seven in 1876; these were chiefly in the larval stage: six were taken in Yorkshire, four in Gloucestershire, one in Warwickshire, four in Nottinghamshire, one in Derbyshire, two in Hants, and one in Carmarthen (Entom. and E. M. M. for 1874—5—6).

Leucania vitellina.—One taken by Mr. George Tate, New Forest, 1876 (Entom. ix. 183); one recorded by Mr. H. Rogers from Isle of Wight, 1876 (Id. ix. 231).

L. albipuncta.—Two each in 1874, at Folkestone (Entom. vii. 228) and Sheerness (E. M. M. x. 180). In 1875, one each at West Wickham and St. Leonards (Entom. viii. 228). In 1876, four, at Deal, Isle of Wight, and St. Leonard's (Id. ix. 231, 232).

L. extranea = *unipuncta*.—Of this truly American species (the dreaded "army-worm") a single specimen was taken at

Lyndhurst, by Mr. E. C. Parker, in 1874 (Entom. viii. 110).

Tapinostola Bondii.—Mr. W. H. Tugwell re-discovered this species at Lyme Regis in 1874, where it had been taken eleven years previously by Mr. P. C. Wormald (Entom. vii. 205, 292).

Meliana flammea.—Has, I understand, been taken this season (1876) "in the fens" in large numbers (*in litt.*).

Nonagria brevilinea.—"Considerable numbers taken in 1874 and 1875, but scarce in 1876" (*in litt.*).

Xylomiges conspicularis.—Taken by Mr. Packman, May, 1875, near Dartford. From eggs deposited by this specimen Mr. Farn reared some fine examples (Entom. viii. 135).

Laphygma exigua.—Taken in 1876 by Mr. H. Rogers, Isle of Wight (Entom. ix. 231).

Pachetra leucophæa.—Mr. W. R. Jeffrey records this species from Ashford, 1876 (E. M. M. xiii. 64). Many others have been sent out of Kent during the last three years; but I know of no other authentic capture.

Crymodes exulis.—Mr. N. Cooke, of Liverpool, takes this species sparingly each season in its Inverness-shire locality (*in litt.*). Mr. Fry's collectors also took several this season in the same neighbourhood (*in litt.*).

Hydrilla palustris.—I understand this rare species has again been taken in Norfolk this season (*in litt.*).

Agrotis Helvetina.—Introduced into the British list in error. The examples turn out to be the red variety (*castanea*, Esp., which is really the type) of *Noctua neglecta* (Entom. viii. 135); therefore this species cannot yet be admitted to our fauna.

Noctua flammatra.—Noted from Norwich by Mr. Thornthwaite, and taken by Mr. Rogers in Isle of Wight, 1876 (Entom. ix. 18, 231).

N. sobrina.—Taken in Perthshire by myself in 1874, and again, sparingly, in 1875, when I bred a couple of dozen. Two taken in 1874 by Mr. J. B. Blackburn, at Rannoch (E. M. M. xi. 116). Four each by Messrs. Wheeler and Richardson in 1876 (Id. xiii. 140, *et in litt.*).

Pachnobia hyperborea.—Turned up in 1876. A full account of the British history of this moth will be found in the 'Entomologist' (ix. 241): the specific name is there incorrectly spelled; corrected in same volume, p. 279.

Dasycampa rubiginea.—Of unfrequent occurrence, as usual. Mr. G. F. Mathew took it in 1875 in Devon, at tallows (Entom. viii. 102). Mr. A. H. Jones took it in 1876 at ivy-bloom, at Tintern (E. M. M. xiii. 162).

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D. Barrettii.—I hear this moth has been again taken at Howth this season by a London collector, four or five specimens being secured. There is some probability that this species will turn out to be a variety of another member of this genus, hitherto unrecorded as British.

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Hydræcia petasitis, Entom. viii. 195.
Xylophasia lithoxylea, E. M. M. xi. 209.
X. polyodon, Id. xi. 209.
Xylomiges conspicillaris, Id. xii. 83.
Apamea gemina, Id. x. 275.
Miana fasciuncula, Id. xiii. 62.
Caradrina morpheus, Id. x. 254.
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Anarta melanopa, Id. xiii. 11.
A. cordigera, Id. xiii. 12.
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Having now completed my summary of *Macro-Lepidoptera*, I hope in next month's issue to finish that of the *Micro-Lepidoptera*.

NOTES ON LYCÆNA ARION.

By GERVASE F. MATHEW, R.N., F.L.S., F.Z.S.

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this fine species is being rapidly exterminated, and, at the present rate of destruction, will in the course of a few years cease to exist in that particular locality.

Lycæna Arion—one of the largest European blues—is a butterfly which, on account of its restricted habits, but few British entomologists have had opportunities of seeing alive, so perhaps some account of my various excursions to Bolt-head in quest of it may not be altogether uninteresting.

My first visit was on July 7th, 1870, and a glorious morning it was, as we left Kingsbridge by steamer at half-past nine for Salcombe. The trip down the estuary occupied about an hour: on the way several likely-looking woods were passed, while on the mud-banks stately herons stood and watched us as we steamed by, or, rising, flew in a flapping, lazy manner a short distance, and again alighted.

On reaching Salcombe I went to the King's Arms Inn, where I procured a bed-room and sitting-room: the floor of the latter showed signs, in the shape of strips of paper, stray pins, &c., of the recent presence of an entomologist. Upon enquiry I learnt that a "fly-catching gentleman" had only vacated the room the previous day; but could not ascertain from the landlady what he had been catching, or whether he had taken any blues: all she knew was that he had been several times out to "the Bolt." By this time it was nearly eleven o'clock, so as soon as I had unpacked my apparatus, and partaken of some slight refreshment, off I started.

The day had now become excessively hot; there was scarcely a breath of air to counterbalance the scorching rays of the sun, and in the evening, when my labours were over, I found the back of my neck was much blistered. The distance from the village to Bolt-head is about two miles, the path in many places steep and rough. *Arion* occurs chiefly beyond the Bolt to the westward, where, between it and the next point, a slope sweeps down from the brow of the high land to the edge of the cliffs below, and here, at times, when the turf is dry and slippery, it is decidedly dangerous to approach too near the cliffs. The upper portion of this slope was thickly overgrown with patches of stunted furze and heather, the latter in profuse bloom; in the open spots wild thyme, *Potentilla*, and bird's-foot trefoil flourished; while, further down, thistles, mullein, and foxglove reared their

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flower-spikes above the bracken; here and there, behind the shelter of a dilapidated stone wall, grew dwarfed brambles; and from the turf, just above the cliffs and right down their face to the rocks below, sprung countless tufts of thrift.

Upon reaching this charming spot *Arion* was one of the first butterflies I noticed; there was no mistaking it: its size and brilliant appearance at once attracted my attention as it flew swiftly towards me, and suddenly settled on a sprig of heather quite close to my feet. For a few moments I gazed at it with rapture, for what exquisite delight one experiences in meeting for the first time in its native haunts a species one has never seen before alive, especially such a lovely insect as this; but my desire to possess it speedily overcame all my admiration; so with a sweep of my net I captured, and then boxed it. In the course of the day I secured about three dozen, and might have taken more had I desired to do so, but found many of them worn: these of course were allowed their freedom. As far as I could judge I should have been on the spot at least ten days earlier, although this species probably soon gets injured when flying amongst the furze, for many, otherwise in perfect condition, had small pieces chipped from their wings, showing that they must have flown, or been blown, against the prickly bushes.

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Dr. Buchanan White's interesting paper on *Hemiptera* in the January number of the 'Entomologist,' in which he draws attention to the comparative neglect bestowed by entomologists upon the study of this order of insects, prompts me to pen the following:—

How seldom do we find in the case of death that the children of any well-known, hard-working entomologist continue to add to their late parent's collection. In nearly every instance such collection, which has probably been the result of a long life's work, is handed over to a museum, sold in the market, or allowed to fall into decay. Now, how is this? May not one reason be, the very completeness of the parent's collection has a discouraging influence upon the children, seeing the small chance that remains of their making any important additions; consequently they cannot have the same interest in it that they would have in a collection formed entirely by themselves.

Some of the happiest hours of my life, even from earliest childhood to the present time, have been experienced in studying Natural History; more particularly in collecting, observing, and arranging *Lepidoptera*. I am most desirous that my children should participate in such pleasure; so it occurred to me some years ago that, by making a typical collection of insects in all orders, I might induce them to select some order in which they took a sufficient interest to make them study it, and collect specimens for themselves. I call these types my "Educational Collection." I have found its arrangement most useful to myself, by giving me a general knowledge of all the orders. It also will, I trust, answer the purpose for which it was undertaken. Indeed, I would recommend such a collection as worthy the attention of all entomologists, not only as a source of interest and amusement to themselves, but they will find their friends take more pleasure in the exhibition of such a collection, than a larger one simply of *Lepidoptera* will afford. The whole of my typical collection occupies five large drawers, eighteen inches by twenty-two inches. It is arranged in accordance with Mr. E. F. Staveley's interesting work on British Insects. The first drawer is devoted to *Coleoptera*, and all the leading orders are represented: the *Adephaga*, *Hydradephaga*, *Necrophaga*, *Brachelytra*, *Clavicornes*, &c. The object is not to exhibit rare individuals, but interesting, typical, and, as far as possible, well-known species, introducing these in their proper places: for example, the tiger-beetle, burying-beetle, devil's coach-horse, skipjacks, pill-beetle, cockchaffer, and musk-beetle; not forgetting the glow-worm, death-

watch, ladybird, &c. The second drawer contains the *Orthoptera*, with the cockroach, mole-cricket, &c.; the *Neuroptera*, *Trichoptera*, and *Heteroptera*. The *Lepidoptera* are well represented in two drawers: four wide columns suffice for the butterflies, which are here arranged according to the late Mr. Newman's classification; the hawk-moths are well represented in one column; the *Geometers*, two columns; and so on. To this collection I have added, whenever procurable, the preserved eggs, larvæ and pupæ of the species represented; thus tracing, as far as possible, the life-history of each. The fifth drawer contains the *Homoptera*, *Hymenoptera*, and *Diptera*.

Let me suggest to others the pleasure and convenience such a collection affords to its owner, in addition to the other reasons I have given for its formation.

Huyton Park, Liverpool.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

TURKEY OAK-GALLS.—During the last summer, having permission kindly given me to search for galls on the trees in the Royal Gardens at Kew, I had opportunity for frequent examination of the Turkey oaks (*Quercus cerris*), which I believe have hitherto been considered as exempt from gall-growths in England, and was fortunate enough to find, though only by careful and repeated search, a very few specimens of a minute gall on the twigs. The first that I noticed were during April, on the lower twigs of a large tree labelled "*Q. cerris*, var. *Lucombeana*," but were apparently growths of the previous season, with the colour of the downy outside so much blackened by age that, excepting size and shape, the thin cell wall, and the decided downiness of the exterior, it was almost impossible to make out any determinate characteristic. Somewhat later in the year I found two more (like the others growing close together, and almost precisely similar to them in shape and size), of which the accompanying figure is a much-magnified representation, in the condition in which they were first observed. These were on a large tree of considerable age, labelled "*Q. cerris*," and placed on a twig at the base of a still smaller one, and (like the others) amongst a few linear stipules. These galls were somewhat more than the sixteenth of an inch in length, and

somewhat less than half that measure in breadth, of an elongated, obtusely oval shape, the lower extremity being completely rounded, and the sides parallel for a short distance, terminating at the upper end in an exceedingly blunt point; the exterior of the gall of an orange-yellow, and forming a thin wall to the central chamber. In most points the galls coincide with the description of the *Spathegaster Taschenbergi*, of Schlechtendal,* and though not quite as large, might be conveyed by the figure 96, plate 7, of the 'Mitteleuropaischen Eichengallen,' of Dr. Mayr, but in the six specimens which I found the amount of woolliness was so much less (if indeed it could be said to exist at all) on the fresh and brightly coloured galls of the true *Q. cerris*, that I feel a doubt of their being of the same species. Some degree of interest, however, attaches to the presence of galls (even undetermined) on the Turkey oak, and as the locality protects both the trees and their almost microscopic tenants from molestation, I hope by careful watching in the coming season to be fortunate enough to secure fresh specimens, in which the insects may still be enclosed, for correct determination.—E. A. ORMERON.



QUERCUS CERRIS.

[The oaks of Europe are divided botanically into two groups:—(1) represented by *Quercus pedunculata*, Ehrh., *Q. sessiliflora*, Sm., and *Q. pubescens*, Willd., with their varieties; (2) represented by *Q. cerris* and its varieties, and it is an undoubted fact that we never find the same species of *Cynipidae* occasioning galls indiscriminately on the two groups; each group has its own restrictive gall-makers. This will no doubt be explicable when the physiology of the gall is known, but in the present state of our knowledge it is hard to say whether the varied influence is insectile or botanical; this exclusiveness is not limited to oak-frequenting species, but pervades in a greater or less degree the whole range of gall life. Of the ninety-six species of European oak-galls described in Dr. Mayr's work, two are synonymic, three

* Stett. Ent. Zeit. xxxi. 391.

species unknown to him and therefore doubtful, whilst seventy are limited to the first group, and twenty-one to the second: from this it will appear that the above communication is especially interesting, as being the first authentic record of a *Cerris* gall occurring in Britain. Other Continental species will doubtless follow the introduction of their special pabulum, which is now so widely distributed in these islands, and when once established their march may be as rapid as has been that of *Kollari*, a most noteworthy occurrence, considering the lethargic habits of the insect, which, though so common, has been noticed on the wing but on one or two occasions; although I have taken and bred some hundreds of specimens, desirous of the male, I don't think I ever saw one fly. I hope further research will complete the history of this species, which, from the nature of the gall, I opine is not included by Mayr, and will therefore prove new.—E. A. F.]

INHABITANTS OF KOLLARI GALL.—Last winter I collected a double gall of this species, and then, in order to examine the enclosed inhabitant of the larva-cell, broke one side of the gall open, but finding the parenchyma tenanted, I isolated it, and in April, May, and June last there emerged twenty-three *Synergus Reinhardi*, Mayr, six *Callimome regius*, Nees, and four *Eurytoma squamea*? Wlk.—all these from three-fourths of a double gall.—EDWARD A. FITCH; Maldon.

PHYLLOXEROUS RAVAGES IN THE COGNAC DISTRICT.—Entomological subjects are thrusting themselves upon us: although the potato-beetle scare is subsiding, we have another, possibly of greater import, nearer home. Brandy drinkers, beware! The price of your favoured liquor has advanced (wholesale) some 50 per cent. within the last six months, and is still rising. This is all due to the scarcity caused by an almost microscopic insect, the now well-known *Phylloxera vastatrix*. Its ravages are but too patent, and by no means have they been abated, in spite of the immense amount of entomological research, both European and transatlantic, which has been expended on the subject. A thoroughly practicable remedy would be cheap at the government prize of £12,000. When will such be forthcoming? However, the object of this note is not to refer to the entomological, but to the commercial, aspect of the question; for when large vinicultural districts, like many of the departments in the South and West of France, come to produce from 75 to 90

per cent. short of an average crop, the matter is serious indeed, both for the welfare of the interested inhabitants of the country itself, and of our own wine imports, should these ravages extend and be continued. We can at present have but little hope of extirpation or abatement, and it is possible that Cognac will be relegated from the spirituous liquors to the medicinal lists; how our wine list will fare deponent sayeth not. The year 1876 will long be remembered as a most disastrous one in the annals of brandy production, the present vintage being of very small proportions. The following is taken from a trade circular, but is believed to represent by no means pessimist views:—"The *Phylloxera* was first noticed in 1865 among the vineyards of the South of France, where it has been ever since committing most appalling ravages. Thus, the Department du Gard, which used to produce 126,000,000 gallons of wine, now scarcely yields 40,000,000; the Commune of Castries, in the Departement de l'Hérault, produced, before the appearance of the *Phylloxera*, 3,000,000 gallons; whereas one year after it did not give more than a quarter of a million; three years later the vineyards had been entirely destroyed. Having travelled in a northerly and north-westerly direction, the 'plague' appeared three years ago amongst the vineyards of the Charentes. At first its ravages were confined to a few parishes; last year it showed itself in more than two hundred, but only in small patches here and there. These patches, however, were so many 'beds of infection,' from which the pest spread to all the vineyards around; and this year entire districts have been laid waste, and innumerable fresh 'beds' have appeared on all sides. It may not be out of place here to quote the words of a speech, made before the Agricultural Committee of Saintes in September last, by M. Dufaure, then Prime Minister of France, who is himself a large vineyard proprietor in the Charentes:—"The *Phylloxera* makes every day fresh ravages; and I ask you, gentlemen, supposing that nothing be found to stop this plague, would you recognise our country, if you no longer saw those magnificent vineyards which cover its soil and make its wealth? Everything has been done: inquirers have sought the *Phylloxera* in the very bowels of the earth in order to destroy it; but until now all the efforts of science have been powerless. The Government has given

this question the greatest attention. The National Assembly, last year, voted a very large prize (£12,000) to reward the discoverer of a means to destroy this vile insect. The new Chamber has equally entered the list. Committees of Deputés and Sénateurs are working actively; and even yesterday I received from my colleague and friend, the Minister of Agriculture and Commerce,—who himself is a very able agriculturist, and collects all information concerning agriculture,—a note, which I was awaiting with impatience, in the expectation to find in it some ground of hope to transmit to you, but from which it appears that until now no efficacious remedy has been found in which we could place confidence.' The quantity of wine produced in most localities varies from 10 to 25 per cent. of a crop; and it is only in a few favoured spots that the yield is from 30 to 50 per cent. of an average."—E. A. FITCH.

ARGYNNIS LATHONIA (VARIETY).—Last summer, while in Norway, I caught a very remarkable variety of *Argynnis Lathonia*: the upper side of both wings is of a sooty black colour, with hardly any markings, excepting indistinct ones on the costal margin. The under side is equally strange; the silver spots have run into one another and form streaks.—R. W. BOWYER; Haileybury College, Hertford.

DESCRIPTION OF THE LARVA OF LITHOSIA MOLYBDEOLA.—On the 28th of November, 1876, I received from Mr. R. Kay (2, Spring Street, Bury) two larvæ of *L. molybdeola*, the larger of which was about five lines in length, and the smaller about four. Head slightly smaller than the second segment, and when the larva is at rest drawn within it, intensely black, highly polished, notched, and rounded on the crown. The body of the larva is dark umber-brown, slightly attenuated towards each extremity, considerably so anteriorly when in motion. Medio-dorsal line velvety black, narrow; subdorsal line also velvety black; seated on this line, on the fifth and each succeeding segment, is an oblong spot of a dull orange colour, becoming almost white anteriorly, this whiteness appearing most conspicuously on the fourth, fifth, sixth, and seventh spots; detached from these spots, and situated on the segment immediately preceding, there is another much smaller white spot, which occurs also on the third segment, although there is no orange spot on the succeeding segment; these small white spots are only visible when the larva is in

motion, being situated deeply in the incisions of the segments. On each segment, and immediately behind each orange spot, where those spots are present, is a wart, from which springs an abundant tuft of short brown hairs; a similar wart is also situated below each spot, and a third below the second; this third wart is placed immediately below the spiracular line, which partakes very much of the dull orange colour of the dorsal spots, and is edged on either side by a narrow line of velvety black; from all the warts there spring similar tufts of short brown hairs. The ventral space is grayish; claspers light brown, furnished with short hairs at their juncture with the body. The eggs from which these larvæ were hatched, Mr. Kay tells us, "were deposited July 24; larvæ hatched in nine days, will feed on lichens, chickweed, lettuce, dandelion, and sallow, and although kept in a warm place with the intention of forcing them, they grew very slowly; apparently they would hibernate in their natural state." As near as Mr. Kay "could tell, the larvæ moulted some ten or twelve times. One of this batch began to spin a cocoon on November 16th, by drawing together two leaves of sallow."—[REV.] P. H. JENNINGS.

EUTHEMONIA RUSSULA.—Whilst collecting in North Kent, on the 28th of June last, I met with *E. russula* in great numbers. I found it required much disturbance of the long grass to get the females to fly, and even then their flight was a mere hover and down again into the grass: the males flew wildly at the slightest disturbance. Amongst my captures were two females, one of which laid six eggs in my collecting box; these I saved. Six days after, upon examining the box I had placed them in, I found six larvæ; these I at once supplied with a few small pieces of lettuce, upon which they fed. They continued to feed well until the end of July: then four of them seemed inclined to hibernate, the other two continuing to eat the lettuce-leaves most ravenously. On the 10th of August one spun up, and the imago, a male, appeared on the 23rd of the same month; the other spun up on the 20th of September, and the imago, also a male, appeared on the 8th of October. The other four larvæ are hibernating: I now supply them with French lettuce leaves twice a week, and they occasionally eat it on mild days.—E. R. SHEPPARD; 13, Limes Villas, High Road, Lewisham.

MACARIA ALTERNATA.—In your “New and Rare Lepidoptera,” &c., in the January number of the ‘Entomologist,’ I note that you chronicle only three localities for *M. alternata* in the past three years. It is perhaps owing to an unintentional reticence on the part of Surrey entomologists that Coombe Wood—one of the favourite habitats of this species—is not included in your list. I may mention, however, that during the last three years, two other collectors and myself have taken between four and five dozen of this species.—R. S. STANDEN; Holmwood Lodge, Surbiton.

VENUSIA CAMBRICARIA, HERMAPHRODITE.—On the 21st of last July I took a hermaphrodite specimen of *V. Cambricaria*. It is a most singular-looking moth.—ARTHUR DONCASTER; Broom Hall Road, Sheffield, November 20, 1876.

ANTICLEA SINUATA IN HERTFORDSHIRE.—On July 27th, 1876, I took a very good specimen of *Anticlea sinuata* in a chalky lane near the village of Farnham, about two miles from Bishops Stortford.—A. J. SPILLER; Nov. 24, 1876.

LARVÆ OF TRIPHÆNA SUBSEQUA.—January and February is the season to sweep the larvæ of *Tryphæna subsequa* if the weather be mild and damp, as it is at present. It is to be found feeding on *Dactylis glomerata*, and sometimes on *Triticum repens*, but the former seems to be its favourite food. Later in the season it seems to be more retiring in its habits, for I have been unable to find it after February, when it may take to other food; but I have reared it entirely on grass. One specimen, found in April, 1874, feeding at night, was still on grass in my garden, so that I am disposed to think it entirely a grass-feeder in the wild state, though some friends have fed it on chickweed and other small herbs.—[Rev.] HENRY WILLIAMS; Croxton.

HELIOTHIS ARMIGERA NEAR BRISTOL.—I beg to inform you of the capture, by myself, of a male specimen of *H. armigera*, at ivy bloom, here, on October 20th. The insect had evidently just emerged, as it is not in the least worn or damaged.—J. PRESTON; Fishponds, near Bristol.

AGROTERA NEMORALIS DOUBLE-BROODED.—As this beautiful little species has hitherto been considered single-brooded, I was much surprised to find that my pupæ, which I had reared from eggs deposited in the first week in June of this year, all produced imagos during the last week of July; some of them only remaining twelve days in pupa. July, 1876, was

extremely hot, and that possibly hurried them through quickly, so that the first week in August would be about the time to look for a second brood at large. This second, or summer brood, like many others that pass rapidly through their metamorphosis, differs considerably from the specimens taken in May, the tone of colouring being decidedly less brilliant. I am disposed to think that most insects which feed up unusually fast, produce, as a rule, duller coloured imagos than those of the same brood which feed more leisurely. Thus *Acidalia emutaria*, that I have reared in a few weeks from the egg state to the imago, have been totally devoid of the beautiful pink tinge that my hybernated larvæ have produced: I am not prepared to say that this is an invariable rule, but my experience points to that conclusion.—W. H. TUGWELL; 3, Lewisham Road, Greenwich.

FOOD OF TORTRIX VIBURNANA.—I see Mr. Stainton, in his 'Manual,' gives *Myrica Gale* and *Vaccinium* as the food-plants of *T. viburnana*. As it is frequently found where neither of these plants grow, I may say that I have, during the last sixteen years, been in the habit of finding large numbers of the larvæ of this moth upon dwarf willow (*Salix repens*) in June, while "sweeping" for the larvæ of *Epione vespertaria*. It is a particularly lively larva. Head is yellowish brown; ground colour of the body dark green, dotted with numerous black spots. In going to pupa it spins a cocoon between united leaves of its food-plant.—WILLIAM PREST; York, December 1876.

[Respecting the food-plants of this species, Kaltenbach, in his 'Pflanzen-feinde,' gives the following on varied authorities:—"Between the leaves of *Viburnum Lantana* and on *Coronilla*, on the authority of the Wiener Verzeichniss; according to Madam Lienig, on *Pinus sylvestris*, either in the young shoots drawn together with threads or between the needles which have dropped on the branches, also on *Juniperus*, *Ledum palustre* and *Pinus abies*; according to Hiememann, on *Vaccinium uliginosum* and *Andromeda polifolia*; according to Hartmann, on *Salix repens*. May and June is given as the time of occurrence in all cases.—E. A. F.]

TINEINA REARED IN 1876.—The following species of *Tineina* were reared during this season:—*Butalis grandipennella*.—

I reared a fine series of this species from larvæ collected from furze-bushes, at Wanstead, the middle of June: the larvæ fed under webs, which are generally placed on stems of some years' growth, and are consequently difficult to collect; I used a strong pair of cutting-pliers for cutting out those portions of the plant containing the webs, which should be disturbed as little as possible. *Anarsia spartiella*.—Bred freely from larvæ collected on the furze-bushes with the above mentioned. *Depressaria costosella*.—I reared this species in profusion, in July, from larvæ found on the three following plants: *Ulex europæus*, *Spartium scoparium*, and *Genista anglica*; those reared from the latter plant are the most beautiful, many being a rich pale brown. *Coleophora genistæcolella*.—I found the larvæ of this somewhat local species tolerably abundant last June, on *Genista anglica*, in Epping Forest, and about fifty moths emerged during July and August. *C. virgaureella* were reared in profusion in August, 1876, from larvæ collected from the seed-heads of golden-rod (*Solidago virgaurea*) in November, 1875: they are easy to rear, if kept exposed to the influences of the weather.—W. MACHIN; 22, Argyle Road, Carlton Square, E.

DOUBLE-BROODED INSECTS.—On August 7, 1868 (an early year), I first took an autumnal specimen of *Lobophora virelata*. On mentioning the circumstance to Mr. Bond, and other practical entomologists, I found they were already aware of the fact of its occurring twice annually. In the same way *Fidonia conspicuata*, *Hadena atriplicis*, and many other species, are double-brooded: but we must follow up Nature in the fields, and in the woods, to ascertain what species are naturally so, and not trust to books. I do not fancy *Papilio Machaon* is strictly double-brooded, like *Agrophila sulphuralis*, which keeps coming out all the summer through. In the autumn of 1871, I collected about six dozen larvæ of *P. Machaon*, all just full fed; the pupæ were all kept during the winter and spring in precisely the same condition; the first butterfly emerged on the 18th of May, 1872, and the last on August 10th, the greater number during the third week in June.—BATTERSHELL GILL; 9, Cambridge Terrace, Regent's Park, N.W.

ABUNDANCE OF LARVÆ.—I have noticed this autumn an unusual abundance of the larvæ of *Pieris Brassicæ*. The

cabbages in this neighbourhood have been literally reduced to skeletons by these pests; the chrysalids are to be seen by scores on every wall. Last August the geraniums and other plants in my garden were swarming with larvæ of *Noctuæ* of various species; the leaves and stalks, especially of the geraniums, were eaten away considerably. I gathered scores of larvæ, which—there being such an assortment—I made no attempt at identifying, but await their arrival at the perfect state.—R. LADDIMAN; Norwich, November, 1876.

[We have received several other complaints of a like character. Mr. Fitch can fully corroborate them, as he had last autumn a field of Swedish turnips—six acres in extent—completely defoliated and destroyed by Lepidopterous larvæ. Many farmers in his county, Essex, have suffered to a greater extent. Vegetables in town gardens have also been in many instances destroyed.—ED.]

A SCOTCH NATURALIST.—We note with pleasure that Her Majesty the Queen has conferred a pension of £50 a year upon Mr. Thomas Edward, of Banff, the subject of the new, but already celebrated, book by Mr. Smiles, entitled the 'Life of a Scotch Naturalist.' Although an entomologist, Mr. Edward is better known to the readers of the 'Zoologist,' than to those of the 'Entomologist.' In the pages of the former are many notes from his pen, of that original and graphic character which we should like to see more frequently in our magazine. In announcing the pension, Lord Beaconsfield says:—"The Queen has been much interested in reading your biography, by Mr. Smiles, and is touched by your successful pursuit of natural science under all the cares and troubles of daily toil." We recommend all our readers, who have not already read this book, to do so. We have rarely found one more amusing or interesting.—ED.

ENTOMOLOGICAL SOCIETY OF LONDON.

ANNUAL MEETING, JANUARY 17, 1877.

Sir Sidney Smith Saunders, C.M.G., Vice-President, in the chair.

An abstract of the Treasurer's accounts for 1876 was read, showing a balance of £6 8s. in favour of the Society.

The Secretary then read the Report of the Council for 1876, in which it was stated that a donation of £150 had been received from Mr. Dunning.

The following gentlemen were elected Members of Council for 1877:—Sir Sidney Smith Saunders, Professor Westwood, Rev. A. E. Eaton, Rev. T. A. Marshall; and Messrs. H. W. Bates, G. C. Champion, J. W. Douglas, J. W. Dunning, F. Grut, R. Meldola, E. Saunders, H. T. Stainton, and J. Jenner Weir.

The following Officers were subsequently elected for the year 1877:—President, Prof. Westwood, M.A., F.L.S., &c.; Treasurer, J. Jenner Weir, Esq.; Honorary Secretaries, Messrs. F. Grut and R. Meldola; Honorary Librarian, Rev. T. A. Marshall.

The President (Professor Westwood) having been unfortunately prevented from attending by an accident, the reading of his Address on the progress of Entomology for the past year was unavoidably postponed until the next Meeting, on the 7th of February.

DEATH OF MR. CHARLES HEALY.—We regret to have to record the decease of this painstaking entomologist. As with many others so with Mr. Healy: his first love was the Macro-Lepidoptera; but it was not long before the Micros received attention, and their various modes of life interested him to such a degree that the larger species became neglected; whilst among the Tortrices and Tineæ various sawflies were naturally brought to his notice, notably the leaf-mining and stem-feeding species. This led to more extended observations; and towards a knowledge of the life-histories of these three families Mr. Healy did much good work: some species were worked out in marvellous detail. These observations were contributed to the pages of the 'Intelligencer' (vol. ii. 1857, *et seq.*) and the 'Entomologist' (vols. ii. to v.). For the last five years he seems either to have ceased to work or ceased to record,—probably only the latter,—as he was always an active member of the Haggerston Entomological Society, almost from its foundation. His occupation through life was that of a solicitor's clerk. Mr. Healy died on the 27th December, 1876, when in the fiftieth year of his age, and was interred at Ilford Cemetery. He leaves behind him a small, but select, collection of Tortrices, Tineæ, and Tenthredinidæ, the greater part of which were bred by himself, being, as he was, far more of an observer than a collector.—E. A. F.

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BIOGRAPHICAL NOTICES.

No. I.



HENRY DOUBLEDAY.

By J. W. DUNNING, M.A., F.L.S., &c.

IN the early part of this century there dwelt in a plain brick tenement, on the north-west side of Epping Street, a worthy member of the Society of Friends, named Benjamin Doubleday. The house had formerly been an inn, the "Black

Boy," but had been acquired by the Doubledays about 1770, and converted into a shop for the sale of hardware, grocery, and provisions generally, such as is commonly found in small country towns. The family of Benjamin Doubleday and his wife consisted only of two sons, the elder of whom, the subject of this memoir, was born in 1809. The sons were brought up to their father's business; and there are those still living who can remember both brothers busy in the shop with their aprons on.

Both sons from an early age exhibited a taste for Natural History, which, so far as can be ascertained, was not inherited from their parents, but was probably developed by the surroundings amongst which their boyhood was spent: for the grand old forest then encircled the little town, and spread, almost unbroken, over nine thousand acres,—a wild expanse, rich with oak and beech and hornbeam, intermingled with ancient hollies and knotted hawthorns, with a tangled undergrowth of roses and brambles in profusion, and lower still, a carpet of flowering plants and ferns, of mosses and many-coloured fungi. Happily the glories of High Beech and other lovely fragments of the old forest still remain to suggest what Epping and Hainault must once have been; and it is scarcely matter for surprise that amidst such surroundings the brothers should have betrayed a liking for birds and insects, and have become careful observers of their habits.

Of the younger brother, suffice it to say that he did not long remain at Epping; but after lengthened travel in the New World, Edward Doubleday became one of the scientific staff at the British Museum, the associate of Hewitson and Westwood in the production of 'The Genera of Diurnal Lepidoptera;' and whilst filling the office of Secretary to the Entomological Society of London his career was cut short before he had completed his fortieth year.

But it is with Henry Doubleday that we are now concerned. It was his fate to live all his life in the primitive little Essex town, to live and die in the very house in which he was born; and his existence was as uneventful as can well fall to mortal lot. A solitary visit to Paris in 1843 was the only occasion on which he ever left England; and though during his father's lifetime he made frequent collecting expeditions, chiefly, however, confined to the eastern counties, these were

in later years almost wholly abandoned; and when in 1873 he spent a couple of days with Mr. Hewitson, at Oatlands, it was the first time he had slept in a friend's house for more than seven and twenty years. Upon the death of his father, in 1848, the entire management of the business at Epping devolved upon Henry Doubleday; in addition to which he was the local agent for the Sun Fire Office, and the Treasurer both of the local turnpike trust and of the Poor Law Union. Henceforth his various duties kept him a close prisoner at home. His collecting excursions gradually ceased, or were performed vicariously by Mr. James English, who, from 1838, had been his constant companion on such occasions, and who continued to collect for him to the last.

It is well-nigh thirty years since Henry Doubleday, by the intervention of the Editor of the 'Zoologist,' was first brought into communication with the present writer, then a lad at school in Yorkshire, who had taken a fancy to *Lepidoptera*, and collected perhaps a couple of hundred of our commoner species. The delight of the schoolboy may be imagined on receiving shortly afterwards a box from Epping containing several score species, chiefly southern, some of considerable rarity, whilst the specimens were mostly bred, and all set to perfection. In this respect my experience was only that of every youngster who came in contact with him. I believe nothing in the world gave him such pleasure as to make up a box of insects which he thought would be useful to any of his correspondents. His liberality was unbounded; nor was it limited to the gift of that for which he himself had no use; but, occupied as he was, he would devote hours of his time to naming obscure-looking insects for anyone who chose to trouble him, and would take endless trouble to enable him to answer conscientiously the multitudinous enquiries that were addressed to him.

I am not aware that Doubleday ever interested himself in any other order of insects than *Lepidoptera*; though a short note by him on *Sympetrum*, a genus of dragonflies, will be found in the 'Entomologist' (1841); and in *Lepidoptera* he had no great knowledge of exotic species, whilst his acquaintance with the European forms was made for the purpose of studying and understanding the British species. In short, it was as a British Lepidopterist that he was

pre-eminent. His British collection was unsurpassed in richness and extent, and was always open to the inspection of any entomologist who would run down to see it. Its fame spread far and wide, and attracted many a visitor to Epping; and these visits of brother entomologists were for years the only breaks in the seclusion of his life.

But Doubleday was not an entomologist only: he was eminent also as an ornithologist and oologist; and many of his observations on birds and their nidification are incorporated in the works of Yarrell, Newman, and others; moreover, he was a capital shot, and could thus not only obtain his own specimens, but could afterwards stuff them and set them up to perfection. During the latter part of his life, however, his attention was less given to birds and eggs. His garden and his greenhouse were his never-failing delight. Always an active man, and fond of out-door exercise, he would rise in summer with the sun, and might be found in his garden at the back of the house looking after his flowers and fruit, or in his paddock beyond the garden noting the birds as they flew over. He also took an interest in photography, and was a considerable reader of contemporary literature.

His life was simplicity itself. Gentle and quiet in his manner, he moved about the house with velvet-tread, as noiselessly as one of his own pet cats. Shy and retiring, even to a fault, he seemed almost to dread to meet a stranger; and doubtless many, on first meeting him, must have felt somewhat disappointed with his constrained reserve. But when once the first interview was over, and the ice was broken, the goodness of his heart shone forth; acquaintance warmed into friendship, and no demand upon his friendship was too great for him to comply with.

His correspondence both with English and European entomologists was extensive; and his letters to his more familiar friends were pleasing from their simple-mindedness. He was a most active penman, and habitually regular in replying to all communications. Occurrences of birds and insects, and details of their habits; the flowering of his plants, or the condition of his strawberry-beds; the death from old age of his gardener, or of a favourite cat; peculiarities of the weather; lamentations over his own health, and enquiries after his friends'; at one time gently chiding the

silly contentions of rival editors; at another, exposing the tricks of those who would palm off, as British, continental specimens which had been relaxed and re-set; the whole mixed up with expressions of gratitude for any little service or kindness rendered to him;—these, and such topics as these, formed the staple of his letters, which, if not of a kind well-fitted for publication, were at any rate the effusions of an honest mind and an affectionate nature.

Henry Doubleday was an original member (1833) and a life-long member of the Entomological Society of London; and a few notes by him may be found scattered amongst the Proceedings of the Society; but his published writings are few in number, and small in extent. His earliest paper was on the habits of the hawfinch, and was printed in 'Jardine's Magazine of Zoology,' in 1837. His first entomological publication appeared in the 'Entomologist,' in 1841, on the occurrence of *Noctua* at sallow-blossoms. In 1842, in the 'Entomologist,' and in 1843, in the 'Zoologist,' he made known the now accustomed plan of "sugaring" for moths. And occasionally throughout his life he contributed notes on birds, bats, and other Natural-History subjects,—chiefly on *Lepidoptera*, and descriptions of new British species,—to the various magazines of the day. But his only work of magnitude was the 'Synonymic List of British Lepidoptera.' Finding on his visit to Paris that the English nomenclature of the order, as then established by James Francis Stephens, was wholly different from that in vogue on the Continent, he set himself to work to compare the two, with a view to ultimate uniformity; and upon this thankless task he spent an amount of study, labour, and time, which can scarcely be credited by those whose recollection does not go back to the days when no 'Doubleday's List' existed. The first catalogue appeared at intervals between 1847 and 1850, but did not include the *Tineina*. The second edition appeared in 1859, and included the whole of the *Micro*-, as well as the *Megalo-Lepidoptera*, the arrangement and nomenclature being chiefly after Guenée. In this list nearly one thousand nine hundred species are enumerated; a first supplement in 1865, and a second supplement in 1873, increased the number to nearly two thousand one hundred species.

It must have been a monotonous and wearisome task,

entailing a vast amount of patient labour and study. Indeed, it is those only who can remember the state of our English collections of thirty years ago who can really appreciate Doubleday's work, and the good that has been effected by the compilation of his List, in which he not only reduced many so-called species to their proper rank of mere synonyms or varieties, but reformed the whole nomenclature of the order, and brought it into unison with that adopted on the Continent.

But the most noticeable thing in Henry Doubleday was his constant and careful observation of the habits and Natural History of species. Probably no man ever reared so many British *Lepidoptera*, and certainly no man ever acquired the same amount of knowledge of the economy and habits of so many species as he. If he could have been induced to take his own List in his hand, and write down all he knew of the different species, his observations would have made such a book as has not yet been written. But though ever ready to communicate information to others, for publication or otherwise, he was never anxious himself to rush into print; and it was only in reply to enquiries that his experience could be drawn out. His diary contained occasional short entries of the occurrence of birds, insects, or plants, with the extremes of the thermometer in early spring; but the bulk of his observations were never recorded, and most of his knowledge has perished with him.

In 1866 he sustained what to him was a heavy pecuniary loss; and, as he afterwards confessed, he lacked the courage to look his difficulties boldly in the face, but lived on as before, buoyed up by hope that all would come right in the end. But in 1870 a crisis came. "Everything has gone against me the last four years (he writes), and I see no prospect of brighter times. I must part with everything, and I am quite broken-hearted." The sale of everything he possessed would not produce sufficient to pay his debts. Ruin stared him in the face: he became melancholy, bewildered, at times delirious; and his mind having for a time lost its balance he was placed in a Retreat, near York, where he passed three months in the beginning of 1871, until under gentle medical care his mental equilibrium was restored.

Very touching are his letters written from the Retreat:—"I do feel so dull and lonely here, and there is no bright prospect

when I leave this place." "What will become of me I cannot tell: I shall have no home to set my foot in." "It is very sad indeed to think that the dear old house, in which I was born and have resided ever since, will soon be in other hands, as well as all my collections." "My thoughts dwell constantly on that dear home where I have had a large share of happiness, and where in fact was everything that I could want." "I cannot help thinking of the loss of everything that was dear to me in the world; and it really seems as though my attachment to my dear home, and my interest in the collection of *Lepidoptera*, was stronger than ever. I have spent a great deal of time in making it what it is, and I hoped that it would be mine as long as I lived, and that I should be able to render it more and more useful to my friends." "How I wish I could see the least prospect of my being able to pass the few short years that, under any circumstances, can be mine in the home that is so dear to me." "How I wish it was possible for me—as a tenant, or in any other way—to remain in my beloved home, which seems dearer and dearer to me every day; the garden was a real source of enjoyment to me: and I am so devotedly attached to the place of my birth, and to my kind friend Ann Main, that I think a separation from them will so affect my spirits that I shall not long survive." "I do not get a great deal of sleep, but I always dream about my home."

His wish was gratified. By the kind intervention of friends his *Lepidoptera* and his books were preserved for him, an annuity was provided sufficient for his modest requirements, and he was permitted to end his days in the old home he loved so well. His gratitude was unbounded; and on his return to Epping, all business being abandoned, he devoted himself again to his old pursuits. His spirits revived, his health seemed to improve; and he was able to produce, in 1873, his second supplement to his 'Catalogue of British *Lepidoptera*.' But it was not for long: and the end came on the 29th of June, 1875.

He lived and died a bachelor. For nearly thirty years a distant cousin and faithful friend ministered to his household wants. Ann Main was to the Recluse of Epping as Judith Bubb to the Man of Ross.

In the very centre of the secluded little burial-ground

which lies behind the Friends' Meeting House, at Epping Street, a plain flat stone bears the simple inscription:—

HENRY DOUBLEDAY,
DIED
29TH OF 6TH MONTH,
1875,
AGED 66 YEARS.

The Meeting House itself is so hidden by the dark foliage of pines that few strangers passing through the town would become aware of its existence: and in the ground behind it our friend has found a fitting resting-place at the end of his peaceful life.

Doubleday paid comparatively little attention to the *Tineina*; but, making all allowance for this, it may be safely said that no such collection of British *Lepidoptera* was ever before made. Whether regarded in respect of its completeness in species, the number and condition of the specimens, and the extent of variation exhibited, it stood unrivalled. It was simply splendid. Happily it remains intact; and together with his collection of European species is, for the present at least, deposited at the Bethnal Green Museum, on loan, and has been placed under the custodianship of Mr. Andrew Murray. Of the two thousand one hundred recorded species of British *Lepidoptera*, nearly two thousand are represented, the whole being arranged in four cabinets, containing together one hundred and six drawers, in the exact order in which Doubleday left them. A room has been specially provided for the "Doubleday Collection," and an attendant is in readiness to show it at all times that the museum is open, *viz.* Monday, Tuesday, and Saturday, from 10 a.m. to 9.30 p.m.; and on Wednesday, Thursday, and Friday, from 10 a.m. until dusk.

It would be affectation to claim for Henry Doubleday a high position among scientific men, or to pretend that he had laid down any philosophic landmark for all time. He was a lover of Nature for her own sake; and, as a naturalist, he was a careful and accurate observer of habits, an ardent collector, and had a good eye for the discrimination of species. As a man, he was remarkable for his gentleness and modesty, for his unselfishness and liberality, for his love of truth and consideration for the feelings and opinions of others.

To those who knew him best his memory will be dearest;

but so secluded was his life, so much did he shun society, that those who knew him personally will soon be few in number. The accompanying likeness is from a photograph taken about 1857. It fairly recalls his presence as he was, though it scarcely reveals the cheerfulness and humour which peeped through his reserved exterior. In his life there were no exciting incidents to tell; but in writing this memoir I have striven to bring out the character of the man, to describe him as I found him,—one of Nature's gentlemen,—to whom may fitly be applied the words, from John Ray's tomb at Black Notley :—

“Non sanguine et genere insignis, sed quod majus, propria virtute illustris. De opibus titulisque obtinendis parum sollicitus, hæc potius mereri voluit quam adipisci: dum sub privato lare, sua sorte contentus (fortuna lautiori dignus) consenuit. In rebus aliis sibi modum facile imposuit, in studiis nullum.”

NOTES ON NEW AND RARE SPECIES OF ACULEATE HYMENOPTERA, TAKEN DURING 1874, 1875, 1876.

By FREDERICK SMITH.

WHEN the ‘Entomologist’s Annual’ terminated its career it had been the means of recording discoveries of new species, and also of making known localities where species of rarity might be found: it had done this during a period of twenty years. Entomologists are greatly indebted to Mr. Stainton for carrying on this annual record of entomological campaigns. Interesting discoveries are, it is true, reported in the ‘Entomologist,’ and also in the ‘Entom. Mo. Magazine;’ but neither of these publications have brought these matters into a focus as they were formerly in the ‘Entomologist’s Annual.’

It might be imagined that during the three years which have elapsed since the cessation of the Annual many new species of *Aculeate Hymenoptera* must have been discovered. This, however, is not the case: two or three, new to the British list, have been found, and several captures of rarities have been made; in addition to which various interesting discoveries, in connection with recorded species, have occurred. At the time of the publication of my work

on the 'Bees of Great Britain,' *Colletes cunicularia* had not been discovered in this country; but fourteen years afterwards, in 1869, it was found near Liverpool. In the following spring Mr. Carrington forwarded a number of this bee alive: these I took to Shirley Common, where, selecting a suitable situation, I made a number of burrows in a sandy slope, into each of which I put a male and a female bee, in the hope of establishing a colony. I was not very sanguine of success, having tried similar experiments with other insects. I brought *Philanthus triangulum* from the Isle of Wight, *Mellinus sabulosus* from Suffolk, and in both cases I failed to establish the species in a new locality; probably if I had dug the insects out of their burrows, instead of taking them on the wing, I should have had a better chance of success. My endeavour to localise the *Colletes cunicularia*, to my great satisfaction, proved a success: a young entomologist brought to me twelve months afterwards a box of bees for examination; among them I found two specimens of the *Colletes*, which he told me he captured on Shirley Common, describing the situation in which he found them. This was the very spot where I had left them. This success is worthy of being recorded, it being the only instance that has come to my knowledge in which complete success has attended such an experiment. I am warranted in saying complete, because Mr. Carrington, who supplied me with the living bees, last year took the *Colletes* himself at the new locality at Shirley.

Andrena ferox—one of the rarest species of the genus to which it belongs, and which has only previously been taken near Bristol—was found last summer, by Mr. E. A. Butler, at Guestling, near Hastings. Another of the rarest of our British bees, *Macropis labiata*, has also occurred near Norwich. The first specimen of this bee, of which we have any record of its being found in England, is one in the collection of the British Museum. For many years this was unique: it was taken by Dr. Leach, in Devonshire, probably half a century ago. Some five and twenty years subsequent to Dr. Leach's capture, a second specimen was taken by Mr. John Walton, in the New Forest: this was deposited in the Shuckardian collection, which perished on its transit from London to Bristol on the Great Western Railway. In 1842 Mr. S. Stevens took a third example, at Weybridge, on the

3rd of August. I have searched for the species at this locality on many occasions, but without success. The three captures enumerated consisted of males. A period of thirty years now elapsed in the history of the captures of *Macropis*, when, in 1874, Mr. Bridgman obtained two males at Brundall, near Norwich; and last summer he succeeded in capturing seven more at the same locality. It is certainly a remarkable fact that no one has succeeded in finding the female, and this circumstance might lead to the inference of the habit of the female having some peculiarity not observable in the other sex: this, however, does not appear to be the case. The males captured last summer, at Brundall, were frequenting the creeping thistle, *Carduus arvensis*; and both sexes have been captured on that plant in Germany. Leon Dufour took them on *Alisma plantago*, and Professor Schenck finds them on the leaves of the dewberry, *Rubus cæsius*. Let us hope that it is reserved for Mr. Bridgman to complete the capture of the species by taking the female next summer.

PANURGUS DENTIPES, *Latr.*,

is now added to the British list, not by a recent capture, but on the authority of a specimen bearing the locality, Salisbury, which I discovered among the males of *P. calcaratus*, in the collection of British bees in the British Museum. This species is not rare on the Continent, and will probably be found at the locality mentioned. I had the pleasure of including this species, in the genus to which it belongs, in the second edition of my work on 'British Bees,' recently published by the Trustees of the British Museum.

NOMADA BRIDGMANIANA, *Smith.*

In the same work will be found described a species of the genus *Nomada* new to science: *Nomada Bridgmaniana*, discovered by Mr. Bridgman, near Norwich. The species is nearly allied to *N. lateralis*, and is one of the prettiest species of the genus.

OSMIA FUCIFORMIS, *Latr.*

In the work alluded to above, another species, *Osmia fuciformis*, is added to the list. In the first edition of the

book I regarded the only examples of the *Osmia* I had seen—two, in my own collection—as small varieties of *O. xanthomelana*. Since that time I have received numerous specimens from Germany; and Dr. Gerstaecker has pointed out the distinguishing characters, which, although slight, are constant. The specimens in my own collection I captured some years ago at Birch Wood; and recently, on examining a box of bees belonging to Mr. G. Waterhouse, I found a single specimen of this species, which was taken at the same locality as my own.

MUTILLA EUROPÆA, Linn.

During last autumn *Mutilla Europæa* was found in several nests of *Bombus muscorum*, by Miss Madeline Pasley, near Wickham, Hants. The specimens of this parasite were kindly forwarded to me; and on the day subsequent to their reception, Prof. Brandt, of St. Petersburg, informed me that he had found them also in the nests of the same species of *Bombus* in Russia. I have at various times taken scores of nests of *B. muscorum*, and also of other surface builders, but I never had the good fortune to find the parasite. I suspect that *Mutilla* more frequently infests the nests of the underground builders in this country.

POMPILUS APPROXIMATUS, Smith.

In addition to the nine recorded British species of the genus *Pompilus* I have to add a tenth, taken by Dr. David Sharp, in Dumfries. It closely resembles *P. niger*, but it is a larger insect: its mandibles are entirely black, except the extreme apex, which is obscurely rufo-piceous. *P. niger* has three teeth in the mandibles, one large and two small ones. The new species has a single tooth, which is only slightly notched inwardly; the third submarginal cell is quadrilateral, and is considerably larger than the second submarginal, and the nervures of the wings are much stronger than in *P. niger*. The latter insect always has the third submarginal cell either triangular or petiolated: in the male that cell appears to be always petiolated. The distinctions enumerated will serve to distinguish the new species: I propose to name it *Pompilus approximatus*.

One of our rarest species of *Fossorial Hymenoptera* is the *Astata stigma* of Panzer. I was fortunate in first discovering it in this country, at Weybridge, in 1845, when I captured two females; ten years subsequently I took another pair at Deal; and in 1875 I took three more females at Barmouth, North Wales: all occurring in the month of August. Last summer Mr. Edward Saunders took two males near Chobham. This species of *Astata* is very like *Tachytes pompiliformis*, the size and colouring of the two insects being the same: the different neuration of the anterior wings would separate them. The vertex of *Astata* is convex, smooth, and shining, and has three distinct ocelli: the male has large approximate eyes that occupy the larger part of the head; it has also a transverse white spot above the insertion of the antennæ.

Oxybelus mucronatus, an exceedingly rare and local species, was taken by myself in August, 1875, at Barmouth: its previous known localities are sandy spots near Bristol, Braunton Burrows, and Deal. Of the genus *Oxybelus* there are four species described, for the first time, in Shuckard's 'Fossorial Hymenoptera,' in 1837, all supposed to have been taken in Devonshire by Dr. Leach, the types being in the British Museum: not a specimen of any of these has been subsequently taken, neither have I seen one in any collection of European *Hymenoptera*. A fifth species stood in the same category, until Mr. Samuel Stevens took a specimen in Devonshire. This species, however, *O. nigripes*, is found on the Continent; but hitherto only the two specimens referred to have been taken in this country.

One of the rarest British species of the genus *Crabro* is *C. signatus*: a male was taken in Tilgate Forest, by Mr. T. N. Hoey, last August. Only a single example of this insect had, to my knowledge, been previously taken in England: it was captured by Mr. Dossetor in Cline Wood, near Swansey, nearly twenty years ago. In general resemblance this species comes near to *C. vagabundus*, particularly to those examples that have the yellow bands much interrupted. *C. signatus* has the enclosed space at the base of the metathorax smooth and shining, and it has a minute tooth near the base of the posterior femora, a little within. The female has not been found in this country, but it is described in my work on the British *Fossores* from a foreign specimen.

CRABRO AMBIGUUS, Dahlbom.

It is now a rare occurrence to have the pleasure of making known the capture of a new British species of *Aculeata*; but a species of the genus *Crabro*, new to the fauna of this country, has been taken by Mr. Vincent R. Perkins. That gentleman submitted to me, for inspection, a box of small species of *Hymenoptera*: among them I found four specimens that I could not refer to any described in my work on these insects. The specimens were males, and belonged to the division in which that sex has dilated anterior tarsi. I could not find the species described either in Van der Linden's work on the *Fossores*, or in that of St. Fargeau; but at last I discovered it to be described by Dahlbom in his '*Hymenoptera Europæa*.' It is that author's *Crabro ambiguus*. The specimen may be recognised by the male having the anterior tibiæ clavate, and the first joint of the tarsi broadly expanded, outwardly convex, and having three black spots on it; the second joint is small, broader than long, and has a minute black spot in the middle of its apical margin. I give descriptions of both sexes, that of the female being compiled from Dahlbom's work.

Male.—Length $2\frac{3}{4}$ lines. Black, smooth, and shining; the head narrowed behind the eyes; the posterior margin of the vertex acutely margined, terminating laterally in an acute angle or tooth; the ocelli in an equilateral triangle on the vertex; at the sides of the posterior pair, an oblique fossulet, that extends to the margin of the eyes; in front of the anterior ocellus, a deep, longitudinal, impressed line, runs to the insertion of the antennæ; the clypeus covered with silvery pubescence; the mandibles black, longitudinally channelled, with two acute teeth at their apex, which is rufo-piceous; the antennæ black. Thorax, above, shining; the enclosed space at the base of the metathorax smooth and shining, having a deep longitudinal channel, and a few oblique striæ at its base; the metathorax is transversely striated posteriorly; the anterior tibiæ clavate, yellow in front and at the apex; the tarsi white; the first joint flattened and broadly dilated, straight in front and rounded behind; convex outwardly, and having three black spots; the second joint small, cordate, and with a minute black spot in the

middle of its anterior margin; the apical joint black; the intermediate tarsi white, with the extreme apex of each joint black; the posterior tibiae clavate, with their extreme base, as well as the spines at their apex, pale testaceous. Abdomen subclavate.

Female.—The size of the male, but more robust; the clypeus, with the anterior margin, widely and slightly emarginate, with four minute teeth in the emargination, the two central ones more prominent than the lateral ones; the clypeus covered with silvery pubescence; the mandibles have a pale yellow line, with their apex rufo-piceous; the anterior tibiae yellow in front, and the intermediate ones fuscous at their base and apex; the posterior coxæ pale testaceous at their apex; the tibiae subclavate, and pale yellow at their base; the tarsi whitish at the base. Abdomen oblong-ovate, the apex rufo-fuscous.

ODYNERUS RENIFORMIS, *Gmelin*

Another fine addition to the British *Aculeata* has been made by the discovery of a species of wasp, new to our insect fauna, the *Odynerus reniformis*. This insect was discovered by Mr. Edward Saunders, near Chobham, Surrey. The male only has been taken: it bears a close general resemblance to *Odynerus lavipes*, which species was discovered some years ago, within a few miles of Chobham, burrowing in bramble sticks. The new species may possibly have the same habit. The male of *O. reniformis* is distinguishable from all the other males of our British species, by having a long yellow spine on each intermediate coxa. Herrich-Schäffer has described this species under the name of *Pterochilus coxalis*. The female is said to resemble that of *Odynerus spinipes*.

27, Richmond Crescent, Barnsbury,
February, 1877.

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR's 'Die Mitteleuropäischen Eichengallen.

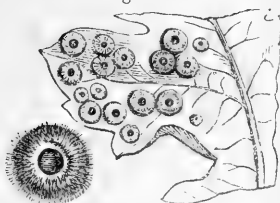
By EDWARD A. FITCH.

(Continued from vol. ix. p. 269.)

62. *Neuroterus numismatis*, Ol. (N. Réaumuri, H.).—This most beautiful of all the lenticular galls (*Linsengallen*)

appears in July on *Quercus sessiliflora*, *pedunculata*, and *pubescens*. It is produced on the under side of the leaf as a small, flat disk, adhering to the leaf in one point only; the

Fig. 62.



NEUROTERUS NUMISMATUS.

outside margin soon thickens, until the mature spherical gall obtains a diameter of three millimetres. The gall is flat next the leaf; the upper part, however, is convex, and considerably indented in the centre; its brown surface is covered with light brown, smooth, silky hairs, which are turned outwards: the interior of the gall contains a small larva-cell. The galls fall in October and November, pass the winter on the ground where they still continue to swell, and the fly appears in February and March. In the neighbourhood of Vienna the galls are rare, but frequently to be met with in the Leithagebirge mountains. I have received it from Herr Kichner from the district of Budweis, and from Herr Forel from the borders of the lake of Geneva.—G. L. MAYR.

We now come to a genus of *Cynipidæ*, the productions of which are well marked as a class, for who has not noticed the oak-leaves in autumn, crowded, so to speak, with little round fungus-looking objects on their under side. It is these which are the galls occasioned by the *Neuroteri*; and for some time their nature was a very fertile subject of dispute amongst naturalists; the botanists holding, I believe, to their fungoid or lichenous nature; while the zoologists had a belief in their indebtedness to insect agency. Their vegetal nature was evident; not so the insect, which is almost or quite imperceptible, until the galls fall from the leaf in the autumn, for it is during the winter and spring that the galls, of *lenticularis* and *fumipennis* more particularly, swell, and the larvæ feed up and change into the pupa state; the gall-makers are evolved about March. It was Réaumur who first discovered the little larva under the galls, and thus set at rest the question of their production. Westwood ('Arboretum Britannicum,' p. 1827) and Smith (Trans. Ent. Soc., London, vol. ii., Proceedings, p. xlii.) were the first to notice it in this country. The genus *Neuroterus*, like *Cynips* and some few

others, contains all agamous species. Hartig bred *N. parasiticus* from the gall of *A. globuli*, and *N. inquilinus* from that of *D. scutellaris*; but these differ somewhat in structure, as well as habits, from the typical *Neuroteri*, and have very properly been transferred to a separate genus (it was partly done by Hartig himself), leaving *Neuroterus* with only gall-producing species. *N. numismatis*, the species more especially under consideration, is the maker of the beautiful "silky-button" galls, so abundant everywhere under oak-leaves in September and October; it is generally found in company with the following species, often interspersed with it, on the same leaf, but the gall-maker appears to attain the penultimate or pupa state somewhat earlier than its congeners. I can speak to this of my own observation, but prefer to give Schlechtendal's dates, which are as follows:—"Galls collected on the 3rd November, when opened on the 11th already contained pupæ with coloured eyes; on the 13th December these pupæ were coloured throughout, and the flies emerged on the 15th." This occurred with galls kept in-doors. And he further says the 14th February was the first appearance made by a *Neuroterus* of its own accord. These galls are generally distributed in Britain, having been recorded as far north as the Cheviots, Perth, and Aberdeen. Only one species of *Synergus* is known to inhabit these galls, viz. *S. Tscheki* (Mayr), which appears in March. Specimens of this inquiline were no doubt taken for the true gall-maker by Walker, who says:—"Last year (1845) I reared from these galls two hundred and fifteen flies, of which there were fifty-seven males and one hundred and fifty-eight females." (Zool. iv. 1457.) The list of *Chalcidiæ* bred at the same time, and given by Walker, is as follows:—"June (second year): *Callimome mutabilis*, one male; *Platymesopus tibialis*, one male. July: *Eurytoma curta*, one male and one female; *E. Æthiops* (Boheman), one female; *Callimome mutabilis*, eight males and twelve females; *C. inconstans*, one female; *C. geranii*, one female; *Pteromalus domesticus*, one female. August: *Eurytoma curta*, one female; *Callimome mutabilis*, one female; *Eupelmus urozonus*, one female." I have bred *Pleurotropis sosarmus* in May. Dr. Mayr does not seem to have been so well acquainted with this gall, as from its great abundance and general distribution in this country we should

imagine, as few are the galls from which he has received no record of parasitism as affected by the *Torymidæ*,—those general controllers of gall-life. However, this species is one of the few, and none of Walker's three are confirmed.*—E. A. FITCH.

NOTES ON LYCÆNA ARION.

By GERVASE F. MATHEW, R.N., F.L.S., F.Z.S.

(Continued from p. 40.)

ON July 8th, 1875, I left Dartmouth by the evening coach, intending to go as far as Kingsbridge, sleep there the night, and take the steamer to Salcombe the next morning; but in the course of the journey one of my fellow-passengers observed that he was going to Salcombe that night, and had ordered a boat to be waiting for him at Frogmore, a little village between Torcross and Kingsbridge, where an arm of the estuary nearly touches the high-road. He kindly offered me a passage, which of course I gladly accepted, as it would save me some distance and expense; also giving a clear day to start with on the morrow. Accordingly on reaching Frogmore we bade farewell to the coach, jumped into the boat which was waiting, and had a pleasant pull down the creek to Salcombe, where we arrived at half-past eight. I put up at my old quarters, the Victoria Inn.

The next morning when I got up, a little before seven, hoping to have a good long day before me, I was wofully disappointed at finding it was raining heavily, with but little prospect of a change. At ten o'clock it became lighter, a slight break appeared in the clouds, and it ceased to rain; so I sallied forth towards Bolthead. However, this was but the forerunner of a more furious downpour, for I had scarcely gone half-way when the rain descended again in perfect torrents. I had to return in a soaking condition to my inn. There was no change for the remainder of the day; the rain poured without intermission. During the afternoon I came to the conclusion that whatever Salcombe might be in fair

* At my request Mr. G. B. Rothera kindly sent me what insects he had bred from the galls of this species. They were as follows:—6th March, 1874, one *Callimome*, sp.? (male); 13th, twenty-four *N. numismatis*; 15th, thirty-six *N. numismatis*; 21st, eighty-four *N. numismatis*; 2nd May, forty-four *P. sosarmus*. The peculiarity of this record is the absence of *Synergi*.—E. A. F.

weather, it was anything but a lively place to spend a wet day in—at least by oneself.

The following morning when I awoke it was fine, but I noticed from my bed-room window broken clouds flying at a great pace across the sky. After breakfast, when I had walked beyond the shelter of the town, I discovered that the rain of the preceding day had given place to a fresh gale from the south-west. On reaching the favourite locality for *Lycæna Arion* I found the wind so strong it would have been impossible for a butterfly to face it; indeed, in some places I could barely stand, so gave up all hope of capturing any by ordinary means; but I thought that by searching to the leeward of bushes and patches of high fern I might possibly find some sheltering. Several hours hard, back-aching work only produced a few *Argynnis Aglaia*, *Satyrus Semele*, and *S. Janira*, many of which upon being disturbed were carried off by the wind at a tremendous pace. I gave it up as a bad job, and returned to Salcombe. Thus ended my second expedition of 1875, for the next day I had to return early to Dartmouth.

It will be noticed that I did not observe a single perfect insect myself that year, but this, in a great measure, was owing to the unfortunate state of the weather at the time of my second visit. A collector who visited the locality a few days later, when the weather was more favourable, took about a dozen worn specimens.

I was unable to go and have another search for larvæ of *Lycæna Arion* in the spring of 1876; but on the 14th July I left Dartmouth by coach for Kingsbridge, and from thence went on by boat to Salcombe, where I arrived about half-past three in the afternoon. The day was most lovely, the sky clear, and heat almost tropical. As soon as I had deposited my luggage at the Victoria Inn I set out for Bolthead. On getting there I saw nothing whatever of *Arion*, but was not much surprised at this, for it is a butterfly that does not fly much after mid-day, and it was nearly five o'clock before I reached its favourite habitat. *Satyrus Semele* and *S. Janira* were very abundant, as was also *Argynnis Aglaia*; but there was nothing like the assembly I witnessed here in July, 1870. Indeed, in this locality I doubt if such a thing will be seen again.

The next morning (July 15th) was most glorious, and after bathing and breakfasting I strolled out to the cliffs, and spent nearly the whole of the day there. The weather was all that could be desired for butterflies,—bright, hot, and cloudless, with scarcely a breath of air; indeed the heat was almost too excessive for active exercise. Had there been many *Lycæna Arion* in existence surely they would have been about on such a day as this, but I only saw five,—one male and four females; and those captured were all considerably worn. The species might have been out for some days, and was passing, which would probably account for my seeing so few. I hoped this was the case; but from information I gathered from persons living in the neighbourhood I fear it is becoming scarcer each season. At any rate, it will be seen from the above that since my first visit, in 1870, it has notably diminished. The question naturally arises as to the cause of this decrease. An entomologist, whom I met on the ground, gave it as his opinion that the chief cause was attributable to burning the heather and gorse in early spring; but this only occurs at intervals of several years, and takes place in patches. Moreover, this burning has perhaps been going on for ages; so I do not think this can be looked upon as the principal reason, although no doubt a considerable number on a limited area may thus perish. My belief is that the ruthless manner in which they are indiscriminately captured and destroyed, by entomologists and collectors, is the primary cause of their annual diminution. I feel convinced if they were left to themselves, and strictly preserved for four or five years, they would become as plentiful again as ever. Now, not a year passes without the place being overrun by collectors; and I was told by a coastguard man, who had been for some years stationed at Salcombe, that he has often seen five or six gentlemen together “hunting flies.” I have seldom been there myself without seeing someone, although those I have been fortunate to meet would, I am certain, only take what number of specimens they actually required, and allow the ragged females to fly. All, however, I am sorry to say, would not be so scrupulous; and they, as I have before mentioned, kill worn specimens in their nets, and afterwards throw them away. That this is often done in pure thoughtlessness, I feel positive.

Should this notice meet the eyes of any entomologists who may hereafter visit Bolthead, may I implore them to spare these wasted females, for it seems a great pity that such a beautiful species should become extinct in this locality, simply for the want of a little proper care.

Since I was at Salcombe in July, 1875, a bird-stuffer's shop has been opened in the town. I paid the owner a visit to enquire if he had any rarities; and after looking at his birds I asked him if he collected butterflies. He replied that he did, and showed me about two dozen *Lycæna Arion* on a board. They were nearly all females, badly set, and in wretched condition; there was not a single specimen fit for a cabinet. Mr. Nicholls, of Kingsbridge, who has long known *Arion*,—in fact, discovered it, I believe, in this locality,—tells me that he is of opinion it is fast becoming exterminated.

H.M.S. "Britannia," Dartmouth,
January 8, 1877.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

DANAIS ARCHIPPUS IN SUSSEX.—Another specimen of *Danaïs Archippus* has been taken in England. Through the kindness of my friend Mr. H. Cooke, of Brighton, I had the pleasure of exhibiting a fine example of this very beautiful butterfly at the last meeting of the Entomological Society. This specimen was captured during the second week in September, 1876, by Mr. Alfred Wood, of New Close, Keymer, Sussex, about four miles from Hassocks Gate. When taken it was flying over clover.—FREDERICK BOND; Staines, Middlesex, February 9, 1877.

[There is no place in Sussex better known to me than New Close. It was the residence of my father-in-law for nearly fifty years. I should think the distance is about five miles from Hayward's Heath, where the other Sussex specimen was taken by the Rev. T. Crallan (Entom. ix. 264).—J. J. W.]

ZYGÆNA FILIPENDULÆ (yellow var.).—I have received some half-dozen specimens of *Zygæna filipendulæ* (yellow var.), taken during the summer by my cousin, Mr. A. W. Bairstow. They were discovered in a chalk-pit at Cambridge, along

with the ordinary type, and it is surprising to find that a variety is so regular in the markings of different specimens. They appear to be somewhat common in the vicinity.—S. D. BAIRSTOW; Woodland Mount, Huddersfield.

NOTE ON *IODIS VERNARIA*.—The powerful attraction possessed by a newly-emerged female *Bombyx* is known to every observant entomologist; but that *Geometræ* occasionally exhibit a similar power is, so far as my experience goes, much less generally known. About daybreak on the morning of the 13th July last, as my friend, Mr. W. J. Argent, and I were returning from a night's sugaring in Darenth Wood, our attention was arrested by a ghostly fluttering on the hedge-bank, which proved to be an assemblage of males of *Iodis vernaria*. So common were they, that one stroke of the net enclosed six, and many were left. The night had been a most unproductive one at sugar, and very little had been seen on the wing: certainly not one *I. vernaria*, the season for which was getting late. Since this occurrence one or two other instances of similar gatherings have been mentioned to me.—BERNARD COOPER; Fern Lodge, Higham Hill, Walthamstow.

PSEUDOPTERPNA CYTISARIA.—I was rather surprised to find the larvæ of this species feeding last June upon common furze (*Ulex europæus*), as well as upon needle-whin (*Genista anglica*) and broom (*Sarothamnus scoparius*).—W. MACHIN.

ACRONYCTA ALNI.—A fine full-grown larva fell into my net while beating the wych elm (*Ulmus montana*) last year, but I sadly fear it has come to grief through an atrocious *Ichneumon*.—F. O. STANDISH; Cheltenham.

ACRONYCTA ALNI (Entom. x. 31).—One more should be added to the seventeen captures of this scarce and beautiful *Noctua*, which are recorded in the summary of British *Lepidoptera*. It will increase the number taken in Hants to three. In June, 1874, Mr. James Gulliver secured at sugar, in the New Forest, a remarkably fine specimen, which is now in my possession. It was the only insect he saw that night at sugar, during a somewhat long round.—JOSEPH ANDERSON, jun.; Chichester.

FOOD OF *TORTRIX VIBURNANA*.—I have repeatedly reared *T. viburnana* from larvæ and pupæ spun up in the leaves of *Teucrium scorodonia* (wood-sage), collected in the Warren,

at Folkestone; so it would appear that its food-plants are various.—F. O. STANDISH; Cheltenham, February, 1877.

GELECHIDÆ REARED IN 1876.—*Gelechia næviferella*.—I reared a large series from larvæ found in August, making conspicuous white blotches in leaves of *Chenopodium*: when full grown they descend into the earth to form their cocoons, the imagos appearing the following May. *G. Hermannella*.—The larvæ of this pretty species I found in profusion in the middle of July, mining the leaves of *Chenopodium*, and reared the perfect insects freely in August; the larvæ were again equally plentiful at the end of that month and the early part of September, thus proving it to be double-brooded; the mine of this larva is very different from that of the preceding species, being hardly perceptible, unless the leaf is held against the light. *G. triparella*.—I reared about forty specimens in May, from larvæ found feeding between united oak leaves, at the end of August; they are not uncommon on stunted scrubby oak bushes in lanes, near Wanstead.—W. MACHIN; 22, Argyle Road, Carlton Square, E., January, 1877.

TINEINA BRED DURING 1876.—*Lampronia Luzella* appeared in one of my large boxes of dead leaves and rubbish, collected during the winter. Its history is still as little known as ever.

L. prælatella was bred from larvæ collected April 8th, amongst wild strawberry. They are easily reared in a flower-pot; nearly all were bred that were collected.

Micropteryx calthella, like *L. Luzella*, crept up in the same box, and afforded no more information.

Eidophasia Messingiella is difficult to find, but easy to rear; some scores of the larvæ were collected, May 13th, at Brockholes Wood, near Preston, on *Cardamine amara*; they spin a few strands of silk across the young shoots, and draw them together, leaving no other indication of their presence.

Depressaria nanatella occurs in profusion amongst carline thistles, at Lytham, and is very easily detected, as when the larva attacks a leaf it draws the two edges together, thus exposing the white, shiny under surface, and feeds in the roll thus made. They are full fed about May 21st.

D. atomella were not plentiful this year. They inhabit the

shoots of *Genista tinctoria*, near Preston, about the beginning of June, and are easily bred.

Gelechia diffiniella, along with *G. tenebrella* and *G. tenebrosella*, are plentiful wherever the little sheep's sorrel (*Rumex acetosella*) grows, and are best obtained by taking away a small bag-full of the plant, which is so plentiful that there is no fear of extermination. I cannot help thinking that the difference between the two latter species is only sexual; they are always together wherever I have taken them.

G. viscariella is scarce; but by nipping off suspicious-looking *Lychnis* heads, and examining them at home, a few were bred. *Lychnis diurna* appears to be the favourite plant.

G. ligulella or *G. vorticella*, from *Lotus corniculatus*. What is the difference between them? I shall be obliged by information from anyone, or would gladly exchange insects for a specimen of each.—J. H. THRELFALL; 4, East Cliff, Preston, December, 1876.

ANSWERS TO CORRESPONDENTS.

J. T. WILLIS.—COMPLETE LIST OF EXOTIC LEPIDOPTERA. —Would you kindly inform me, through the pages of the 'Entomologist,' if there is published a complete list of exotic *Lepidoptera*, and where I could obtain it?

[We are not aware of any complete list of *Lepidoptera* of the world. There is one of the butterflies of the world,—a perfect monument of patient labour,—by Mr. W. F. Kirby, of the Royal Dublin Society, to whom we cannot do better than refer our correspondent.—ED.]

S. G.—We use, and recommend, a 'Manual of British Botany,' by Professor Babington, of Cambridge. Seventh edition, 1874. London: Van Voorst. Price 10s. 6d. For those who are not proficient botanists we, in addition, suggest an 'Illustrated Manual of Botanic Terms,' by Dr. M. C. Cooke. London: Hardwick & Co. Price 2s. 6d. Also, a 'Manual of Structural Botany,' illustrated, by Dr. M. C. Cooke. London: Hardwick & Co. Price 1s. We take this opportunity of reminding many of our correspondents how exceedingly useful is even a limited knowledge of Botany to those who study Entomology.—ED.

REVIEW.

Catalogue of British Hymenoptera in the British Museum.

Part I.—ANDRENIDÆ and APIDÆ. Second edition. By FREDERICK SMITH, Assistant Keeper of the Department of Zoology. Lond., 1876. Published by order of the Trustees.

IT is twenty-one years since the first edition of this standard work of reference was published. That edition was written by the present author after twenty years of intimacy with his subject, for so far back—as he himself told us—do his continuous observations date. To that long period we have now added in this second edition the result of another twenty-one years of unremitted care and study. Such is the experience which eminently qualifies the author to commend to his readers a theme in itself so attractive as the British Bees.

Following a rule of the British Museum, this book is called a "Catalogue;" but such a title is rather apt to mislead the uninitiated, who may pass it as simply a dry list of names of the species contained in the National Collection. This is not the case, for it is a most interesting and elaborate monograph of two divisions of the *Aculeate Hymenoptera*.

Apart from its scientific value, this work contains much simple and readable Natural-History writing of such a pleasant character that the student will find many a paragraph, the interest of which will lighten his labours while identifying species. For instance, of the *Andrenidæ*, Mr. Smith says:—

"The bees included in the genus *Andrena* may be called the harbingers of spring. One of the first to appear is *A. Clarkella*: this species has been observed as early as March 4th, before the snow had quite melted, and when unusually warm weather had set in; *A. gwynana* was found at the same time at Hampstead. The usual time when the *Andrenidæ* make their appearance is April, early or otherwise, according to the suitableness of the weather."—P. 21. * * * "These bees are subject to the attacks of parasites. The first to be remarked upon are those bees which compose the genus *Nomada*: they are more popularly known as wasp-bees, since they bear a considerable resemblance to some of the small solitary species of that family. These parasites appear to be upon a perfectly friendly footing with the industrious bees, and are permitted, without let or hindrance, to enter their burrows. It has been advanced as a proof of the ingenuity and artifice necessary to be employed in effecting the deposit of their eggs in the working bees' nests, that the parasites should bear a close resemblance to the bees upon which they are

parasitic. Some instances may undoubtedly be advanced, as *Apathus* and *Bombus*, and also in the different species of *Volucella*, which infest the nests of humble-bees; but amongst the solitary bees no such resemblance is required to aid in any necessary deception.”—P. 22. * * * “I have on several occasions watched with much enjoyment a large colony of *Eucera longicornis*, the males occasionally darting forwards with great velocity, then turning sharply round, and, as it were, swimming in circles close to the ground, then darting off again and again in an unceasing round of sportive enjoyment; their industrious partners, whose whole existence appears to be bound up in one unceasing round of labour, would occasionally return home laden with food for their young progeny. Sometimes it would happen that a *Nomada* had previously entered her nest. When such proved to be the case she would issue from it, and flying off to a short distance wait patiently until the parasite came forth, when she would re-enter and deposit her burden.”—P. 22.

The author very justly says, “If I were asked which genus of bees would afford most abundant and interesting materials for an essay on diversity of instinct, I should, without hesitation, point out the genus *Osmia*.” His introductory remarks to this genus do indeed form such an essay. From it we cannot do better than quote the following, as a curious example of delayed development under certain circumstances:—

“There is another species of this genus, whose habits are so different from the rest that our admiration of the ingenuity of these bees is greatly increased when we consider its curious details, and reflect upon the degree of care and foresight exhibited by the provident parent; this is the *Osmia parietina*, a bee only as yet found in the northern parts of this country. This species selects the under side of a slate or stone lying on the ground, and having a hollow space beneath; to the under side of such stone the bee attaches little masses of pollen and honey; on each she deposits an egg, from which a larva is hatched in a few days, which feeds upon the provision stored for it by its provident parent. A stone of this kind was found in 1849 at Glen Almond, Perthshire, on the Grampians, at an elevation of eight hundred feet above the level of the sea, by Mr. J. Robertson, who, on turning up the stone, observed a mass of cocoons of some insect. Although not possessing much knowledge of Entomology, still he knew them to be the production of some insect. He presented the stone to the British Museum, and it was placed in my hands for observation. The size of the slab was ten inches by six, and the number of cocoons attached to it two hundred and thirty. When first discovered about one-third of them were empty: this was in the month of November. In the beginning of the following March (1850) a few males made their

appearance, and shortly afterwards a few females were developed. They continued to come forth at intervals until the end of June: at this time there remained thirty-five undeveloped cocoons. On opening one or to two, in 1851, they proved to contain living larvæ. These cocoons were again carefully closed, and the whole left undisturbed until the month of April of the following year (1852), when on examination they were found still to contain living larvæ. At the end of May these changed to pupæ, which about the end of June became perfect insects, when both sexes made their appearance. This, then, was the result: a portion of eggs deposited in 1849 had been three years arriving at maturity, or rather, in all probability, their development had been retarded; when discovered in 1849 one-third of the cocoons were found to be empty; in 1850 a few males and females appeared; in 1851 the same occurrence took place, and then the stone was presented to the British Museum, and placed in my hands for observation; in April, 1852, all the rest of the cocoons produced bees or parasites, the latter proving to be a species of ruby-tailed fly, *Chrysis bicolor*, a species new to the British list. In the first instance all the deposit was subjected to the same influences, and had produced larvæ. The same may be said of them when taken by Mr. Robertson to Edinburgh; and yet only a few of each sex were developed. The following year produced the same result; and the third year the rest appeared. What was the cause of this retarded development it is difficult to conceive."—P. 150.

In his prefatory remarks to the genus *Saropoda*, Mr. Smith reminds us of rare times of luxurious idleness, when we have laid upon thyme-scented banks, conscious only of perfect quietness and rest, after the fatiguing work of a hot morning's collecting. Then have we been awakened from our day-dream by the busy hum of these lively insects:—

"Of all the busy bees that revel in the beauty of a summer's day, *Saropoda bimaculata* must ever be an especial favourite. It is only to be found when it is sunniest, brightest, and hottest,—when summer days are summer days indeed. Who has not heard its merry hum? Who has not seen it, when for a moment it settles on a flower, or rests on some sunny bank panting with delight? the eyes splendid as opals: could their brilliancy be preserved, this bee would rival and challenge admiration with the most brilliant of its tribe. It is a local species, but abounds in many localities. It flies with incredible swiftness, darting from flower to flower with the rapidity of lightning; again settling, it resumes its loud and cheerful note, merry and joyous as the cricket on the hearth."—P. 185.

In introducing the important *Bombi* (humble-bees), Mr. Smith says:—

"An interesting feature in the history of the *Bombi* is the varied temperament of the different species, and the degrees of pugnacity with which some species will resent any attempt to invade their domiciles. Nests of the surface-builders may be taken almost with impunity, whilst such an outrage on the under-ground ones would be a dangerous undertaking. No species is more courageous than *B. lapidarius*, and *B. virginalis* is equally formidable. This relates to such attempts being made in the height of the season; later, in the autumn, the bees lose their courage, and offer little, if any, resistance to attack on their habitations."—P. 198.

Limited space alone bids us curtail our extracts. However, the above are some of the natural-history touches, which are mixed up with dryer descriptive portions of this work. So abundantly are these observations interspersed, that there is scarcely one of the genera or species with regard to which the author has not some valuable notes to give, derived from personal observation.

The new edition of Mr. Smith's 'British Bees' bears evidence of careful revision; much that is new has been added, and some corrections appear. It is now 8vo in size, while formerly it was 12mo. The ten plates have all been revised, some of the figures re-drawn, others touched up, and one error corrected, *viz.* pl. vi., fig. 5, in first edition, was really the tongue of *Sphecodes gibbus* in miniature; now it is re-drawn and corrected, representing that of *Prosopis signata*. These plates are very beautifully and correctly drawn, the whole being the work of the author, who is both artist and engraver in this case. The synonymy is brought up to the present time; much revision has been done in it; its arrangement is better, being in chronological order. One of the most important new features is that the geographical distribution and number, or approximate number, of known species in each genus is given. Ten new British species have been added in this volume, whilst two formerly believed to have been British have been omitted: this leaves the number of bees enumerated as members of the British fauna at two hundred and eleven. It is our duty to point out one or two inaccuracies in botanical nomenclature.

We need only add that to the student of the *Aculeate Hymenoptera* this book is invaluable; yet it is so plainly written that the beginner may readily identify his species, and learn how, when, and where, to take the "British Bees."—J. T. C.

THE ENTOMOLOGIST.

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APRIL, 1877.

[No. 167.]

LEPIDOPTERA EASILY OVERLOOKED.

No. I.—EBULEA STACHYDALIS.



EBULEA STACHYDALIS.



EBULEA SAMBUCALIS.

It is my intention occasionally to figure in the 'Entomologist' examples of moths likely to be overlooked on account of their resemblance to some nearly-allied and common species, and to point out the differential characters. To this I hope to add such hints upon the habits of the species under consideration as may lead to its more frequent observation in Britain. There can be little doubt that if their appearance and habits were better understood, many of our rare *Lepidoptera* would be more frequently observed.

As, in the summary of *Micro-Lepidoptera*, there is occasion to mention (Entom. x. 91) the addition to the Fauna of Britain of *Ebulea stachydalis*, by the acute observation of Mr. C. G. Barrett, who found it near Pembroke, I cannot do better than represent this species, and by its side, for the convenience of comparison, its commoner relative, *E. sambucalis*.

Ebulea stachydalis, although very closely allied to *E. sambucalis*, is usually smaller, and of a darker appearance. The wings are broader and shorter, with a more strongly waved hind margin, and the apex of the anterior wings more acute than in the latter species. *E. stachydalis* has

only two, instead of three, yellowish spots on the anterior wings; this being a constant and certain character. These spots are smaller, and the wing has less of the yellow dusting, the absence of which gives it the darker shade of colour. Another notable difference is that the male of *E. stachydalis* has on the under side of the antennæ exceedingly fine, but distinct, down: to see this requires a magnifying lens. In the male of *E. sambucalis* this down is absent, but replaced by fine dentations.

If, during the middle of June, we examine, or beat in the neighbourhood of beds of the unpleasant smelling woundwort (*Stachys sylvatica*, *S. palustris*, or *S. arvensis*), we shall probably find the imago of *E. stachydalis*. These plants are usually common, and very generally distributed over Britain, as their names signify, in woods or hedgerows, boggy places, and cornfields, respectively. The two former are the most likely to produce this moth; in fact, Mr. Buckler has found the larva on *S. sylvatica* (Entom. x. 91). A further acquaintance with *E. stachydalis* induces Mr. Barrett to say that "when alive it is *not* strikingly like *Sambucalis*, but from its shorter, squarer fore wings, its darker colour, and square discal spot, is actually far more likely to be mistaken, when flying, for *Scopula olivalis*" (E. M. M. xii. 158). It is sluggish and reserved in its habits, "fluttering close among its food-plant when disturbed."

The larvæ may be found early in September, feeding in folded leaves of *Stachys*, forming "a sort of tube," while the larvæ of *E. sambucalis* feed about the same time on the under side of elder leaves (*Sambucus nigra*), protected by a whitish silken web. Several of our correspondents have found occasional specimens amongst their *E. sambucalis*, where they have been placed as dark varieties. The specimens, from which the accompanying descriptions and figures are taken, have been kindly lent by Mr. Bond.

We shall be pleased to hear from correspondents who have captured this species, as a knowledge of its geographical distribution in this country will be interesting.

JOHN T. CARRINGTON.

Royal Aquarium, Westminster,
March, 1877.

PHYTOPTUS OF THE BIRCH-KNOTS.

By E. A. ORMEROD.

AMONGST the various forms of galls caused by *Phytopti* the peculiar growth of twigs in the birch tree (commonly known as witch-knots) is of some interest, from the attack of the gall-mites producing an increased development of woody growth from the infested buds, instead of—as is usually the case—leaf-galls, or diseased leaf-buds alone.

As far as I am aware attention has not yet been drawn to this point. Dr. F. Löw, in his notice of the *Phytoptus* galls of the *Populus tremula* (Verh. der z.-b. Gesellschaft, Wien, xxiv.), mentions the shortened twigs bearing the leaves in unnaturally close proximity, which in some degree corresponds with one stage of the birch growths, but he does not allude to any increased development of the twigs; and in the 'Pflanzenfeinde' of Kaltenbach, beyond an allusion to these growths, there is no instance given of woody growths under the head of *Phytoptus*.

Dr. J. W. H. Trail, in his papers on Scottish galls, mentions finding multitudes of *Phytopti* on the *Betula alba* (Scot. Nat. iv. 17); but in this case they were observable amongst the patches of vesicles growing in depressions of the leaves.

The witch-knot, or great bunch of twigs looking like a large bird's nest fallen at random amongst the branches of the birch, is familiar to all; and having noticed some of these on birches planted by the road-side in the neighbourhood of Isleworth (Middlesex), an examination of the trees showed them to be suffering so much from the attack of the gall-mite as to allow of its effects being traced from the commencement. The affected buds are distinguishable by their swollen form,—after a time by the knotted clusters into which they are thrown by the diseased development of great numbers of them close together; and in November the four-footed *Acarus* (*Phytoptus*) is to be found in an active state amongst the inner scales,—in considerable numbers, certainly, but still to be counted rather by dozens or scores, than by the hundreds or innumerable quantities noticed in some other cases of *Phytoptus* bud-possession. The infested buds may be distinguished by their spheroidal shape, greater size, and

loosely imbricated irregular scales (as shown magnified, fig. 1), from the natural growths, which are smooth and lanceolate in general outline. A few months later (about the beginning of February) a touch to one of these distorted buds will often throw off all the diseased scales, and at their bases the coming growth will be found in the numerous minute round buds set close together on the common thickened centre, as shown, magnified, at fig. 2. The growth of the knot from these embryo buds is the work of years; but whilst the tree is still bare of leaves it may be found in every stage of progress: the shortened shoot beset with swollen buds, as (magnified) at fig. 3; the compound form, where many buds have grown close together so as to present a hard cluster,



Fig. 1

E.O



Fig. 2

E.O



Fig. 3

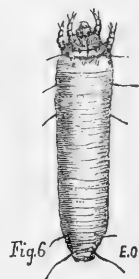
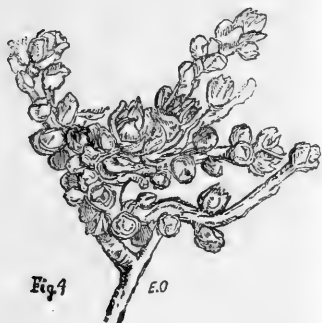
E.O

with a few shoots starting from it, fig. 4; and so onwards, till the witch-knot is fully formed, a mass sometimes more than a yard in diameter.

The *Phytoptus* causing the diseased growth is grayish white, cylindrical, and rarely exceeding one two-hundredth of an inch in length, and a quarter of that measure at its greatest width; but its powers of elongation and contraction make it difficult to give more than an approximate measurement. From the insertion of the legs to the caudal foot the *Phytoptus* is marked with transverse striæ of such minuteness as to give about a hundred to the length of the body, these in the early life of the gall-mite being deeply corrugated; when full grown the bands are marked with dots, about thirty-two to the circumference of the mite, having a projection, when seen against the light, as if possibly composed of a pencil of short hairs. The legs, at full stretch, only extend about half their length beyond the head, and when in motion the

difference in form between the species of sucker-foot and the neighbouring bristle appendages is clearly visible. In the act of walking the terminal portions of the leg are pressed down so as to be almost at right angles with the parts above, and the sucker-foot may be seen with a small enlargement at the extremity while free; when the leg is drawn forward in the act of being raised the appendage may be seen curved backwards as if still adherent, and then loosened and withdrawn with a sudden jerk.

Fig. 6 represents the *Phytoptus* much magnified, but still, from the exceeding minuteness of the mite, gives only a



general idea of its structure. The chief peculiarity in the appearance of this species, compared to the figures which I have had the opportunity of examining, is in the greatest width being immediately behind the insertion of the legs, instead of further back, so that the somewhat sudden tapering to the head gives it a more angular form. The caudal extremity is distinctly lobed, and capable of being curved downwards, and of free use as a caudal foot of sufficient power for the gall-mite to raise itself on it completely free of other support. On each side of this caudal foot is a stout bristle, and at a short distance a smaller pair is set on the upper part of the back. Three other pairs are placed—one just behind the insertion of the legs, the others at short distances from them along the sides of the body. These hairs appear, excepting in the case of the caudal bristles, to be frequently deciduous after death;

but whether from their absence, or from not having a sufficiently powerful object-glass to discover them, I was unable to see more than these five pairs of bristles on or under the body. The corrugated furrows beneath, behind the insertion of each pair of legs and of the head, with their longitudinal lobes, and the movement of the mouth, as the mite moved it on the surface of the slide, were clearly discernible.

About the beginning of February I found numerous egg-like bodies amongst the diseased leaf-scales, from which *Phytopti* were shortly after disclosed, occasionally perishing whilst partly excluded from the pellicle, so as to give ample opportunity for examination. These eggs, or egg-like bodies, were bluntly ovate (as in fig. 5, magnified), much produced and lobed at one end, in a way that would correspond with the caudal extremity of the contained *Acarus*. The pellicle was similarly transversely striated, and before the exclusion of the contained gall-mite was dragged out of all resemblance to the form of an egg, and left sometimes with the markings at the two extremities, having much the appearance of a cast skin, except in the absence of limbs and appendages.

The *Phytoptus*, on exclusion, was fully half the size of the full-grown specimens; and from the relative measure of the egg-like mass, and the full-grown *Phytopti*, the change of skin seems to be the more probable hypothesis than original hatching. Here, however, more observation will probably make all clear as the season proceeds.

Isleworth, Middlesex, Feb. 1877.

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR'S 'Die Mitteleuropäischen Eichengallen.

By EDWARD A. FITCH.

(Continued from p. 70.)

63. *Neuroterus lenticularis*, Ol. (*N. Malpighii*, H.).—The honour of having satisfactorily distinguished the flies which produce the lenticular galls is due to Von Schlechtendal, but the distinction of the galls themselves still leaves room for improvement; the three species which most resemble one another are *N. lenticularis*, Ol. (*N. Malpighii*, Hart), *N.*

læviusculus, Schenck (*N. pezizæformis*, Schl.), and *N. fumipennis*, Hart. (*Spathegaster varius*, Schenck). The galls of *N. lenticularis* seem to occur on *Q. sessiliflora*, *pedunculata*, and *pubescens* (this, however, requires confirmation, as

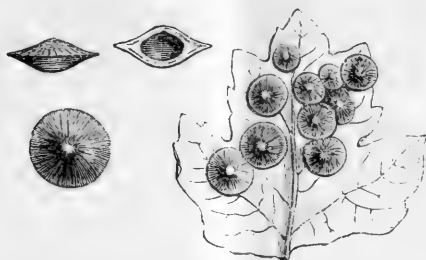


Fig. 63.—NEUROTERUS LENTICULARIS.

formerly the three above-mentioned species may have been taken for one another): they appear in the middle of summer on the under side of the leaf, but do not grow through: the gall at first consists of a flat disk, closely adhering to the leaf, but only attached in the centre, and reaches a diameter of six millimetres; it is yellow or red, and covered with rather long brown stellated hair; it becomes gradually raised in the centre; the under side is nearly flat, with white spots near the margin, and more scantily covered with hairs. The galls fall in October, and pass the winter on the ground, leaving only a spot on the leaf as a trace of their former presence: whilst there they swell lentiform, lose many of their hairs, and remain in a sappy state till the gall-makers, which are developed in the centre of the gall without an inner gall, appear in the first half of the month of March. After the above description it need hardly be said that the gall-makers can only be bred unless they, like all deciduous galls, are placed on damp sand, or are not collected from under the oaks till February.—G. L. MAYR.

This is by far the most abundant of the three closely-allied species of *Linsengallen*. It will be found, I believe, to be almost ubiquitous in Britain, and where it does occur it is everywhere gregarious (if that can be said of a gall); the most

northern recorded locality I know of is that of Aberdeen, by Dr. Traill, in the 'Scottish Naturalist.' There is an interesting account of the different aspects of, and life in, these galls, by the late Mr. F. Walker, in the 'Entomologist' (vi. 504), and the following unpublished note relating to parasitism is from the same pen:—"About 600 females, but not one male, appeared in March, 1874, from galls which I had collected in the preceding winter; they were followed in April by about sixty of *Synergus Tscheki*, so that the latter was to the former in the proportion of about one to ten; then came a few examples of a *Eurytoma* and a *Callimome*, whose specific names may be deferred." *Tscheki* is the only *Synergus* mentioned by Mayr as in any way related to these galls; he says:—"In a hot room I obtained a specimen as early as the 28th of December, and two specimens of the gall-maker on the 4th of January." I have bred it as late as June 28th. The *Eurytoma* has elsewhere been given the specific name *signata*, but that is a name which I am afraid "shall seem to signify." Of the *Torymidæ* Dr. Mayr, in his Essay, gives three species bred from these galls, two of which are new species described by him, both peculiar to the spangle galls, both received from Schlechtendal, and both bred in the spring of the succeeding year; their names are *C. hibernans* and *C. sodalis*. *Hibernans*, which differs from *sodalis* in having a rather shorter ovipositor, was also bred by himself; both species are closely allied to the common *C. auratus*, Fonsc., which may be bred from these galls, according to Taschenberg. It is difficult to say which species Walker's specimens may be referred to; however, in the 'Cistula Entomologica,' where Walker gives a *resumé* of Mayr's monograph, he says—"I have reared *Syntomaspis fastuosus* (Boh.) from these spangles." Mayr himself received seven Saxony bred females of *S. caudata*, Nees, from Von Schlechtendal, but as Walker had just studied the monograph before giving the above information it is only fair to suppose that both species have a *penchant* for *Lenticularis* larvæ. Speaking of *Entedon flavomaculatus*, Ratzeburg says, "Herr Tischbein obtained it from *Cynips Malpighii*," but I think it is probable that it was parasitic on some leaf-miner, either *Orchestes* or *Lithocolletis*, being a known inhabitant of the mines of both the Coleopterous and Lepidopterous genera.

The same author speaks of *Megastigmus Bohemanni* (i. e., *dorsalis*, Fabr.) as a parasite—this also on the authority of Tischbein—but it needs confirmation. On the 20th and 22nd April, 1875, I bred two parasites from these galls, which cannot be referred to any of the above; they belong, I believe, to one of the numerous genera of *Pteromalidæ*, but I have as yet been unable to identify them. *Pleurotropis sosarmus* may be bred from these galls in some numbers from the end of April to May, as well as from *N. numismatis*.*—E. A. FITCH.

NEW AND RARE MICRO-LEPIDOPTERA OBSERVED DURING THE YEARS 1874, 1875, 1876.

By WALTER P. WESTON.

PYRALIDES.

Odontia dentalis, W. V.—Occurred freely at Folkestone among viper's bugloss (*Echium vulgare*). The more inaccessible the place where the bugloss grows, the greater the chance of finding *Dentalis*.

Aglossa pinguinalis, Linn., var. *Streatfieldii*, Curt.—A specimen of this rare variety was taken on August 18th, 1875, by Mr. C. A. Briggs, in an empty room in a house at Teddington.

A. cuprealis, Hub.—Dr. Battershell Gill had the good fortune to find this species in an old flour-mill near Cambridge. Mr. Thurnall also records it from Whittlesford, in the same county.

Pyrausta punicealis, W. V.—The Rev. J. Hellins (E. M. M. xi. 66) records the breeding of this species from larvæ feeding on catmint (*Nepeta cataria*). He gives a full description of the larva and of its mode of feeding.

Agrotera nemoralis, Scop.—Occurred in East Sussex in great abundance. Mr. W. H. Tugwell records its capture

* Mr. G. B. Rothera's record is as follows:—March 6th, 1874, one hundred and eight *Neuroterus lenticularis*; 7th, one hundred and sixty-four and one hundred and twenty-two *N. lenticularis*; 28th, two *Callimome* (? male and female). April 9th, one *Callimome* (? female); 12th, one *Callimome* (? female). May 4th, twenty-nine *Pleurotropis sosarmus*; 10th, fifty-six *P. sosarmus*. The *Torymidæ* specimens may be *C. hybernans*, Mayr; but they were difficult to determine with any certainty. There is again an absence of *Synergi*.—E. A. F.

there in the 'Entomologist' for 1874, and also gives an account of its life-history (Entom. ix. 179). Its capture is also mentioned from the Blean Woods, near Herne. Mr. S. Stevens, at a meeting of the London Entomological Society, exhibited specimens taken in Abbot's Wood, Lewes.

Diasemia literalis, Scop.—On May 2nd, 1876, Mr. C. G. Barrett found a new locality in South Wales for this rarity, where he succeeded in taking a tolerable quantity. Though not generally known, it also occurs in Hampshire, between Winchester and Southampton.

Nascia ciliaris, Hub.—Occurred again in the fens, a single specimen being taken at light in 1876, by Mr. E. G. Meek.

Cataclysta lemnalis, Linn.—Mr. W. Buckler (E. M. M. xii. 102) gives a most interesting and detailed history of the earlier stages of this species. By long and careful examination of the specimens under his notice, he has been enabled to record with the greatest minuteness not only the earlier habits of an insect whose larval history has been hitherto veiled in obscurity, but also a parasitic disease to which the larvæ appear to be subject.

Paraponyx stratiotalis, Linn.—Following up his researches, Mr. Buckler also (E. M. M. xii. 160) describes the larva of this species. He notices the differences in the habits of each of the larvæ under his observation, and specially remarks a peculiar habit of theirs, which consists of a vigorous waving motion of the whole body, except the last three segments, at intervals of from one to three minutes. He says, "That this energetic undulation is connected with the respiration of the larva is evident from the fact that the branchial filaments are then all in strong action, for, instead of radiating as they do in repose, they become depressed a little, and point forwards in the direction of the head."

Hydrocampa nymphaealis, Linn.—Mr. Buckler also (E. M. M. xii. 210) publishes the life-history of this insect. The larva feeds on broad-leaved pond-weed (*Potamogeton natans*), generally keeping its case beneath the leaf, while it eats away the lower cuticle. As it gets full fed it seems to grow bolder, and feeds in a more exposed position.

Acentropus niveus, Oliv.—Mr. Platt Barrett notices its appearance in abundance at Sheerness, in August, 1875, at a locality where it was scarce the previous year. There were

hundreds dead on the water, and numbers clinging to weeds and blades of grass, or hiding under stones near the water's edge. The life-history is given in E. M. M. xii. 257. Mr. Dunning has also contributed a very valuable paper on the nomenclature of this insect to the Entomological Society.

Botys nubilalis, Hub. = *B. lupulinalis*, Gn.—Mr. C. G. Barrett records the capture in July, 1874, of an insect which was unknown to him, on a window in the south of London. On forwarding it to Professor Zeller, he returned it as this species. Mr. Barrett's specimen is of a pale fuscous, a form not uncommon on the Continent; and his capture adds another to the few instances of the occurrence of this species in this country.

B. lancealis, W. V.—We are again indebted to Mr. W. Buckler for a description of the larva of this insect. He gives a detailed account of its habits in vol. xii. of E. M. M. The larva feeds in a web amongst the leaves of hemp-agrimony (*Eupatorium cannabinum*) in August and September. When full fed it spins a cocoon, within which it hybernates and changes to a pupa early in the following May; and the moth emerges at the end of the same month, or beginning of June.

B. terrealis, Tr.—Mr. J. B. Hodgkinson records having bred this species in 1874, from larvæ feeding on golden-rod (*Solidago virgaurea*), in the previous September. Mr. G. T. Porritt also gives a description of the larva in this magazine for last year.

EBULEA STACHYDALIS, *Zinc.*

PARIETARIALIS, *Mann.*

This interesting species was added to the British fauna in June, 1875, by Mr. C. G. Barrett, who discovered it in the neighbourhood of Pembroke. Mr. Barrett has since taken several specimens; and the species is fully described, and its synonymic history given by him (E. M. M. xii. 158). Subsequently Mr. Bond, at a meeting of the Entomological Society in April, 1876, exhibited a specimen taken by himself at Kingsbury, Middlesex, in June, 1862. Mr. Buckler likewise gives a good description of the larva (E. M. M. xiii. 133).

Pionea extimalis, Scop. = *P. margaritalis*, Fab., W. V.—A specimen is recorded by Mr. Pratt, from his garden at

Mile End: a strange locality, unless gardens there are given up to the growth of ill weeds and rank vegetation.

Spilodes palealis, W. V.—This formerly rare species has been taken in some plenty in late years. It is commonest at Folkestone, where numbers have been taken and bred from larvæ feeding in the seed-heads of wild carrot (*Daucus carota*). Mr. Hodgson also records having found it numerous at Sheerness. Mr. C. W. Simmons bred it in 1875, from Dartford, where the larva was common in 1874, though only occurring there sparingly the previous year or two. Its capture is also noticed from the railway slope, near New Cross; at Manchester; and on the banks of the Mersey, near Liverpool. Dr. Gill took two specimens in Norfolk; and a few have occurred in North Kent.

Scopula decrepitalis, Herr.-Sch.—The Rev. W. Hambrough mentions the occurrence of three specimens in May, 1876, in the Trosachs, Scotland, amongst a profusion of whortleberry (*Vaccinium vitis-idaea*).

Lemiodes pulveralis, Hub.—Dr. Knaggs records the reappearance of this rarity at Folkestone, in 1874. The year following about a dozen occurred there amongst rank herbage; and in 1876 it was taken in some plenty.

Mecyna polygonalis, Hub.—A single specimen is recorded from the same favoured locality, in 1875, by Mr. Haggard.

Scoparia scotica, White.—Must, I fear, stand only as a variety of *S. cembrae*. Even its sponsor is, I think, now of this opinion.

S. ingratella, Zell.—Mr. W. Machin has reared this species from larvæ in the roots of sorrel, collected at Folkestone, in April, 1874.

1, Duncan Terrace, N., March, 1877.

ON MELANISM IN LEPIDOPTERA.*

By NICHOLAS COOKE.

Mr. Birchall and Dr. Buchanan White have recently given us some of their ideas with regard to melanism in *Lepidoptera*, which appear to me far from satisfactory.

* Read before the Lancashire and Cheshire Entomological Society, at a meeting held at the President's house in February, 1877.

Both are of opinion that "natural selection" solves a great part of the difficulty there is in arriving at knowledge of the cause of melanism. I cannot understand, for my own part, what natural selection has to do with it. I boldly deny there is any such influence at work amongst either *Sphingidæ*, *Bombycidæ*, *Geometræ*, or *Noctuæ*. The *Diurni* which do not pair soon after they emerge from the pupa may, to some degree, select their mates; but the other classes above named, as far as I have observed, pair without any selection whatever. The female, as soon as she is mature, and sometimes before maturity, exercises an irresistible influence over the males, which, as soon as perceived by them, brings them in search of the object of attraction; and the first male which reaches the female, no matter if a cripple, is allowed by the female to pair with her. I have seen *Notodonta trepida*, in Delamere Forest, paired before the female was fully developed. Was there any selection there? Mr. Greasley and I, when hunting for *Cheimatobia boreata* last November, in the above locality, repeatedly found females of *C. boreata* paired with miserable little males, whilst a dozen or more far better developed males were hanging to the twigs in the vicinity, having evidently arrived too late.

I could multiply the evidence on this point, but I feel sure that every one of experience will grant that natural selection does not exercise any influence in causing melanism in most classes of *Lepidoptera*. I wrote to Mr. Birchall with regard to this point, and he admitted that "sexual selection" did not appear to have so much to do with melanism as the "survival of the fittest" larvæ. I grant that the fittest larvæ survive—and what is the consequence? We find the fittest larvæ of certain species here produce a darker variety than the fittest larvæ in another locality, and *vice versâ*; other species are here produced of a lighter variety than in the other locality; for instance, we take *Hadena adusta* here in abundance, but they are all light-coloured; in Glen Spean this species occurs in profusion, but no light varieties can be met with. In this neighbourhood we take *Acronycta leporina* of a tolerably deep gray colour; at Loch Laggan it is beautifully white, with the characteristic marks dark. Here, we have *Pieris napi* white; at Roy Bridge, Inverness-shire, I took several very dark ones: all I saw were dark, and I

have one nearly suffused with black. *Plusia festuæ* is here of a rich dark colour; in Glen Spean it is much lighter; and I could go on enumerating these differences in coloration, but I have instanced enough for my purpose. Neither sexual selection nor the survival of the fittest larvæ account for melanic variation. We must look for other causes.

The most interesting case of melanism that has come under my observation—and my friend Mr. N. Greening, of Warrington, can say if I exaggerate the facts—is the total change in the colour of *Tephrosia biundularia*, in Delamere Forest. Some thirty years since, when he and I visited Petty Pool Wood, this species was very abundant, appearing in March, and was to be found through April and May, but all were of a creamy white ground colour; dark varieties were so scarce that they were considered a great prize. Now, it is just the reverse; all are dark, smoky brown, approaching black; a light variety is very rare. The same change, and nearly to the same extent as regards numbers, has come over *Amphidasis betularia* throughout the district, from Petty Pool, including Warrington, to Manchester; the black form is now usually found. I am inclined to suspect that climate and manufactures have done more to bring about this change than anything else. During the past thirty years what large towns have sprung up to the west of this district! Runcorn, Widnes, St. Helens, Earlstown, Wigan, &c., all pouring forth from their tall chimneys chemical fumes and coal smoke, which emanations are carried over our collecting grounds by every westerly wind; and the wind is westerly for nine months out of the twelve. This may have effected a change in the climate, as well as deposited on the leaves of trees and food-plants of *Lepidoptera* matter which may possibly cause some white insects to become gradually black, through being swallowed by the larvæ along with their food.

Electricity may have something to do with causing curious varieties occasionally, but I question very much its having any influence in creating such a change as that which has taken place in the colour of *T. biundularia*. It is also likely, I think, that geological formation influences colour in insects; for we find species on chalk and limestone of light colour, and dark species more prevalent on other formations; but there does not seem to be any law even here, for the

same formation produces white butterflies and black moths: for instance, *Pieris brassicæ* and *Mania maura* occur in the same locality. However, geological formation may have more to do with the existence of permanent varieties or evolution than we at present think.

I have before me some closely-allied species, with their anal appendages denuded, in order to compare the difference of structure in different species, and in varieties of the same species. There is very little, if any, difference between the anal appendages of *Acronycta psi* and *A. tridens*, yet the larvæ are very distinct. The sexual organs of *Cerastis vaccinii* differ little from those of *C. spadicea*, but how far their larvæ differ I do not know from experience. I find a slight difference between *Epunda lutulenta* and its variety *Luniburgensis*, but a very marked difference between these varieties and *E. nigra*; also a great difference between *Tephrosia biundularia* and *T. crepuscularia*, as well as between the varieties of *Triphæna orbona* and *T. fimbria*. On comparing the anal appendages of a male *Crymodes exulis* from Iceland with another from Inverness-shire, I found them identical; until then I believed them to be distinct species. When we discover the larvæ of this species in Scotland we shall then be able to determine whether ours is a mere variety of *C. exulis* or not; but at present I still think it doubtful, because I find the anal appendages of closely-allied species in some cases identical; and I am certain that the *Hadena assimilis* of Doubleday has different habits in Scotland from those of *C. exulis* in Iceland.

If the doctrine of evolution is a true theory, then these varieties are most interesting: they appear to me to be carrying into effect the laws of Creation before our eyes. It is just as easy for the Creator to say, "Let there be a man, and there was a man," as to say, "Let there be light, and there was light;" but if the latter was the way in which man sprang into existence, how comes there to be such a race as ours, and another so different as the negro race? Darwin justly remarks, when speaking of races of men:—"Some of these, such as the negro and European, are so distinct, that if specimens had been brought to a naturalist without any further information, they would undoubtedly have been considered by him as good and true species." So with varieties

of *Lepidoptera*, if evolution is a fact: these differences which so puzzle us are changes going on which will in time cause certain forms, which we now call varieties, to rank as distinct species. Though it is a grand display of creative power to say, "Let there be this species and that species," and they exist, may it not be equally a manifestation of Omnipotence to imagine progressive development producing all the variety of animal life, and so executing the law and design of Almighty wisdom and power.

Gorsey Hey, Liscard, Feb. 12, 1877.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

FURTHER NOTES ON *LYCÆNA ARION*.—With reference to the notes of Mr. J. Brown (Entom. ix. 204) and Mr. G. F. Mathew (Entom. x. 35) I have noticed that many Lepidopterists appear to be in doubt as to the exact time of the year during which *Lycæna Arion* is on the wing in this country. Several authorities give July; but I should say that the time at which it may be met with in the greatest perfection is from the second to the fourth week in June. It was on the 26th of June last, in an unfrequented part of the West of England, that I first had the pleasure of seeing this lovely species alive. In the locality flowers were abundant, especially wild thyme; and before I had been on the ground ten minutes I saw several specimens of *Lycæna Arion*. In the course of three hours I netted about thirty-eight specimens, nine of which were so chipped and worn that I set them at liberty. On the following day I again visited the locality in which I had found *Arion* on the previous day, and in the course of an hour and a half I netted about a couple of dozen specimens, of which I only kept fourteen. Possessing that "wholesome dread of exterminating species," I refrained from visiting the same locality on the 28th, and went instead to a new neighbourhood, some fifteen miles further west, where it was rumoured that *Arion* had been taken many years ago. In this locality I did not see a single specimen of *Lycæna Arion*; but *L. Alsus*, *L. Adonis*, and *L. Agestis*, were all common, as was also *Acidalia ornata*. The spring of last year was very cold, and the season, prior to July, was

certainly not forward, yet out of sixty-six specimens of *Lycæna Arion* netted by me on the 26th and 27th of June, only forty-six, or little more than two-thirds, were in fine, or even fair, condition. Such being the average condition of the species on the 26th and 27th of June in a backward season, I think one may fairly assume that the last stragglers must have been *passé* before the middle of July; and I am not surprised, therefore, that Mr. Brown "only took one specimen" on the 17th of July, and that Mr. G. F. Mathew found many specimens worn on the 7th of July. *Lycæna Arion* is undoubtedly a very local species in this country; but I fancy that when the whole of the south-western and western counties have been thoroughly explored, we shall hear of its occurrence in several hitherto unrecorded localities.—H. Goss; The Avenue, Surbiton Hill, Surrey, Feb. 1877.

IDENTITY OF PAPILIO XUTHUS WITH P. XUTHULUS.—During my four years' residence in Japan both my friend Mr. H. Pryer and I were at a loss to account for *P. Xuthulus* having only one brood, whereas all the other Japanese *Papilios* had three or more. We determined to investigate the subject. In the spring of 1875, on the appearance of *P. Xuthulus*, we watched the females depositing their eggs, from which in the month of June we reared *P. Xuthus* (the large dark form). In September of the same year we obtained batches of eggs from *P. Xuthus*, which in the spring of 1876 produced *P. Xuthulus* (the small light form). These facts should be sufficient to convince even the most sceptical on the subject.—F. M. JONAS; 51 & 52, Fenchurch Street.

DESCRIPTION OF THE LARVA OF EPHYRA ORBICULARIA.—On the 29th of July last I received, through the kindness of Mr. J. G. Ross, of Bathampton, a dozen full-grown larvæ of this species. Length about an inch, and of moderate bulk in proportion; the head has the lobes rounded, is slightly notched on the crown, and is the same width as the 2nd, but narrower than the 3rd, segment. Body cylindrical, and of nearly uniform width throughout, the front and last three posterior segments, however, being slightly narrower than the middle ones; the segmental divisions are well defined, and the skin has a somewhat tough appearance. Ground colour of the dorsal surface bright apple-green; head pale brown, very prettily reticulated and spotted with dark brown,

and two stripes of the paler brown colour running through each lobe are very conspicuous; a pale grayish line, finely edged with dark green, forms the dorsal stripe; the subdorsal lines are of the same colour, but waved throughout their entire length; the whole of the spiracular region, including the space between the subdorsal and ventral regions, is in some specimens entirely white, but in others is very delicately and beautifully marked at regular intervals throughout the entire length, with blotches of pink or bright pale purple. On each side of the 5th, 6th, 7th, 8th, and 9th segments, is an oblique smoky mark, each mark commencing on the front of the segment, and extending backwards into the pale spiracular area; the usual dots and spiracles are distinct, black. The ventral surface is green, with five longitudinal white stripes,—a central one, and two on each side outside it; the usual dots distinct here, too, and also black; the prolegs tipped with pink. Feeds on saw; and when full fed, like others in the genus, affixes itself to a leaf by the anal claspers, and spins a band or belt round the middle of the body, exactly in the same manner as the *Pieridæ* amongst the butterflies. The pupa varies from half to three-quarters of an inch in length, and is of the usual *Ephyra* shape and position. Head square and blunt, and from it the body is attenuated gradually and evenly to the anal point; the front and back are rounded, but are distinctly divided by a lateral ridge, which extends a little beyond the head on each side, forming two short blunt points; the back is also slightly arched. Ground colour of the pupa grayish white, with the leg- and wing-cases veined with smoke-colour; there is a pale gray longitudinal line through the centre of the back, and on each side of it a series of black dots. Two imagoes emerged about the middle of August; the remainder of the pupæ stand over until spring.—GEO. T. PORRITT; Highroyd House, Huddersfield.

FOOD OF LOBOPHORA VIRETATA.—I am enabled to add two others to the published list of food-plants of *Lobophora viretata*: they are *Rhamnus frangula* (alder buckthorn) and *Viburnum opulus* (guelder-rose). Those recorded are *Ligustrum vulgare* (privet), *Acer Pseudo-platanus* (sycamore), and *Hedera Helix* (ivy).—G. C. BIGNELL; Stonehouse, Plymouth.

HYDRILLA PALUSTRIS.—In 1864 I had the pleasure of exhibiting to the Entomological Society a specimen of *Hydrilla palustris*, captured in 1862 by Mr. Scholfield, in Quy Fen, Cambridgeshire. (See Proc. Ent. Soc., 1864, p. 20; and Ent. Mo. Mag. vi. 218.) In the Supplement to Henry Doubleday's 'Synonomic List of British Lepidoptera,' published in 1865, the name was removed from the "Reputed British Species," and took its place in the List. In 1869 Mr. Barrett captured a male specimen near Norwich. (See Entom. iii. 252; Ent. Ann., 1870, p. 124.) On recently perusing a number of letters, written by the late Henry Doubleday, I found the following, dated Epping, 7th August, 1870:—"English's boy brought me a few *Lepidoptera*, which he took near Cambridge, and among them is a fine male *Hydrilla palustris*, a species of which I did not before possess a British specimen." I cannot find that this capture was ever published. The specimen may be seen in the Doubleday Collection at the Bethnal Green Museum.—J. W. DUNNING; 24, Old Buildings, Lincoln's Inn, February 27, 1877.

HADENA SATURA.—A single specimen, in my collection, was taken by Mr. John Hancock, while it was at rest on the fencing of Brandling Place, Newcastle-on-Tyne, in the month of April, 1845. August is stated to be the usual time of appearance of this moth. This exceptional instance has, I believe, never been recorded.—V. R. PERKINS; Wootton-under-Edge, January, 1877.

HELIOTHIS SCUTOSA.—In the valuable list of scarce insects, contained in the last two numbers of the 'Entomologist,' the capture of *Heliothis scutosa* is noticed, and the question is asked whether anyone has confirmed the correctness of my identification. It may be of interest to know that a second specimen of *H. scutosa* was captured in the same Norfolk locality last year. This insect I have presented to Mr. C. G. Barrett (who confirms my nomenclature), as a mark of my gratitude to him for the most useful information I have derived from his "Norfolk Lepidoptera," whilst collecting in that county.—W. H. THORNTON; 416, Strand, W.C., February 19, 1877.

TÆNIOCAMPA INSTABILIS.—What will the readers of the 'Entomologist' think when I state that I have visited the Sallows every spring for the past thirteen years, and during

that period have captured all the *Tæniocampa instabilis* I have seen, and have placed them *all* in my cabinet: the total number is three.—G. C. BIGNELL; Plymouth.

COLEOPHORIDÆ REARED IN 1876.—*Coleophora juncicollæ*, in its little brown case, is most easily procured by beating heather into an umbrella in spring, placing the *débris* in a bag until one gets home; then into hat-boxes, with gauze over. The larvæ will soon be detected crawling up for light and air.

C. pyrrhulipennella in the same way; but this is rather local, and can only be taken in quantity by a fortunate chance.

C. laricella: in the larch plantations, at Witherslack, I have seen every bud bleached by the ravages of the larvæ of this little moth; in turn they were being destroyed by large red ants, which were climbing about the branches until they found their prey, when they dropped headlong with it in safety to the ground.

C. albitarsella is rather common on the ledges of rocks on Whitbarrow, on wild marjoram, but will not feed on the marjorams grown in gardens, as I found to my cost when I bred them.

C. fuscocuprella has been taken this autumn in profusion in larval state on the nut bushes in Grange. It prefers a south or western aspect, and feeds principally on the little leaves at the termination of a bough. Like all other *Coleophoridæ* it feeds underneath the leaf, and makes three or four brown spots, which at once discover its presence. The best time for collecting this larva is September and beginning of October.

There is on the peat at Witherslack a *Coleophora*, with its case similar to *C. viminetella*, feeding on *Myrica Gale*, but which will also feed on willow. It has never been bred separately, but it appears to be a more metallic insect than *C. viminetella*, when caught on the wing.—J. H. THRELFALL; 4, East Cliff, Preston, December, 1876.

LARVA OF ARGYRESTHIA ANDEREGGIELLA.—I have been in the habit of taking this beautiful little moth for twenty years amongst crab- or wild-apple trees (*Pyrus Malus*), but had utterly failed to find the larva, until by accident I found it at Windermere. Being tired one day in June I sat down out of the

sun under a large beech tree, and as I never think of having a nap when I should be working, from habit my eye was looking for something or anything. Eventually it rested on an old leafless crab tree, on which were some fine silken threads shining between me and the light at the end of the twigs. Up I got at once, saying to myself, "Now for *Andereggiella*." And so it was; for upon looking beneath the web I found, snugly ensconced where the pith should be, a fat larva. I further secured a dozen more larvæ. These left the web and made a pretty white cocoon on the box-lid. In a fortnight after I bred nine lovely specimens of *Argyresthia Andereggiella*.—J. B. HODGKINSON; Preston.

LAVERNA RASCHKIELLA.—I am not aware of any record that this species has occurred elsewhere than Box Hill, where I discovered it in 1856, as recorded in Stainton's 'Annual,' 1857. The larva is to be had plentifully in some of the woods here, mining the leaves of *Epilobium angustifolium*, which grows in great profusion. I have not seen its congener, *Laverna conturbatella*.—F. O. STANDISH; Cheltenham.

DORYPHORA DECEMLINEATA.—Her Majesty's Commissioners of Customs have received advice of the discovery of living examples of the Colorado potato-beetle at Bremen. They were found upon tubers imported from New York. Specimens have also been seen in other parts of Germany. The commissioners have consequently issued a circular to the various port collectors of customs in the United Kingdom, desiring that certain instructions already given be rigidly enforced, with respect to potatoes imported from Germany, with a view to prevent the introduction of this dreaded insect into Britain. It is undoubtedly quite right to take these precautions, and be, as far as possible, on the safe side; but I do not think that there need be much alarm or panic in this country with respect to the beetle, even if a few specimens should manage to get imported. Any large number is not likely to be introduced at the same time. The temperature and climatal conditions of England and Colorado are so *utterly* different, that I cannot imagine the creature would be likely to multiply to such an extent as to become a pest, though it is not improbable that stray specimens of it might get disseminated, and even keep up the breed. It is true that some foreign

Coleoptera have been imported and naturalised, and have occasionally multiplied to a sufficient extent to produce serious mischief; but these are chiefly *Cucujidæ*, *Bruchidæ*, *Dermestidæ*, *Ptinidæ*, *Calandridæ*, &c., and their ravages are almost exclusively limited to granaries, hide or fur stores, and other places *under cover*. I am not aware of any *imported* Coleopterous insect having ever multiplied to the same degree when exposed to an *out-door* life, and the influences of our wet and variable climate; and the chief ravages of the *Doryphora* are committed upon the field crops during the growing season, not upon the stored produce.
—J. A. POWER.

REVIEW.

Economic Entomology. By ANDREW MURRAY, F.L.S.—
APTERA.—Prepared at the request of the Lords of the
Committee of Council on Education. London: Chapman & Hall.

AMONGST the oldest inhabitants of the Bethnal Green Museum is the collection illustrative of Economic Entomology. When the branch museum shot out from its parent stem at South Kensington, this collection was among the first of the objects to travel eastwards; and, let us hope, has not proved the least attractive or least useful of its contents. To this was subsequently added types of the *Lepidoptera* taken within a radius of ten miles from Bethnal Green. These were presented by the Haggerston Entomological Society; and now the museum contains the far-famed Doubleday Collection of *Lepidoptera*. These, with a fine series of exotic *Coleoptera* and silk-producing insects, also removed from South Kensington, form quite an entomological feature in this industrial and educational institution.

In reviewing Mr. Murray's book it is necessary to draw attention to this economic collection. Few, indeed, in this country, are the exponents of Natural History in its applied or practical relations, compared with those of continental nations,—notably Germany and Sweden. The collection at Bethnal Green—that of Economic Botany from Kew, and other South Kensington collections—will, we hope, form the

basis on which to establish a technological museum, which may lead us to take greater interest in Economic Natural History. Even this collection, were it only made complete enough to clearly exhibit Technical Entomology (*i.e.*, so to arrange the life-history groups that they may be, in a sense, self-explanatory, requiring neither guide nor curator to connect the cause and effect), would do much to teach a percentage, at least, of what Mr. Carlyle is pleased to call the "thirty millions, mostly fools," to know and recognise their insect friends or foes.

To the general public these groups may, like many others, please and possibly instruct whilst they are under inspection; but the impression is very fleeting. To obviate this it is proposed to issue a series of handbooks on the various subjects, so that the good engendered may result in lasting benefit, if the interest is only excited sufficiently to ensure perusal. They are prepared, by order of the Lords of the Committee of Council on Education, by Mr. Andrew Murray, and are to serve as guides to the different branches of the collection, and as practical treatises on Economic Entomology.

This volume, the first which has appeared, treats of the *Aptera*. It is to be followed by the *Hemiptera*, the *Orthoptera*, &c., as set forth in the advertisement. We can but recommend this first part as treating of a class but little understood by British entomologists. The next part will probably give us a surer standard by which to gauge the value of the series.

The volume now under notice contains, after a brief notice of the woodlice, a collected history of the centipedes, scorpions, spiders, the various mites, ticks and lice, and the spring-tails (*Thysanura* and *Collembola*). These constitute the order *Aptera*, or wingless insects, as understood by Mr. Murray; and heterogeneous it is indeed. The mites come in for by far the greatest amount of attention, and are fairly well treated, thanks to the writings of Boisduval, Buckholz, Claparède, Dufour, Dugés, Dujardin, Frauenfeld, Fumouze, Furstenberg, Gervais, Giebel, Hering, Hermann, Kirchner, Koch, Kolenati, Laboulbène, Landois, Löw, Mégnin, Müller, Nicolet, Robin, Scheuten, Thomas, and some few others. This is opportune, as these creatures seem to be fast drawing into the field of general zoological research.

They have been much neglected in this country; but the volume now before us will serve to give a very general idea of their forms and habits. Their history, as expounded by the continental authors, has been very carefully collated by Mr. Murray; and the numerous figures illustrating these chapters will also make the determination of the now known forms a comparatively easy task. The lately published papers of Dr. Thomas, Dr. Kramer, Dr. Flögel, and M. Mégnin, contain further facts. The latter has given us, in addition to his other valuable contributions to Acarology, a most complete life-history of two species of the little scarlet *Trombidii*, from the egg, through the hexapod form to the octopod, and perfect state, illustrated by two admirable plates (Ann. Sc. Nat., 6th ser., Zoologie, iv. 4). The gall-making *Phytopti* are also worthy of further observation: one or two of their productions have engaged attention in Britain, but very little is known of the mites themselves.

We cannot find space to go further into the contents of the volume, but suffice it to say that it treats of many well-known and repulsive pests, giving information known to but few. It may interest some of our readers to know that "the simplest, easiest, and most effectual of all contrivances to destroy mites in cabinets, is to expose a few crystals of pure naphthaline for an hour or two in the drawers." As a handbook it cannot be expected to contain much new information or scientific discovery. Indeed, such pretensions are clearly disavowed in the Introduction; but as a *résumé* of published information it is very complete. With its four hundred and thirty-three pages, and four hundred and fifty-seven figures, it is well worth the outlay of three shillings, and deserves attentive perusal. Should it not add to the knowledge of the specialist, it will certainly do so to the general entomologist or zoologist, and cannot fail to instruct all readers.—E. A. F.

DEATH OF JAMES SCOTT BOWERBANK, F.R.S., LL.D.—It is with deep regret we have to record the death, on the 8th of March, at the advanced age of eighty years, of Dr. Bowerbank, whose name as an eminent naturalist and microscopist is familiar to all our readers. It is intended, if possible, to give a biographical notice and photograph in the May number of the 'Entomologist.'—ED.

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HELIOTHIS SCUTOSA.

By EDWARD A. FITCH.



HELIOTHIS SCUTOSA.

THE palpi are rather conspicuously porrected; the antennæ are simple in both sexes; the fore wings have the costal margin slightly arched, and are almost pointed at the tip; their colour is pale smoky gray, but indistinctly marbled with lighter and darker markings; the discoidal spots are very distinct, their median area is considerably darker than the ground colour of the wing, and they have a still darker circumscription; they are contained in a moderately well defined median band; there is a somewhat irregular but very distinct pale line almost parallel with the hind margin, on which is a series of seven compound black and gray dots; the wing-rays are distinctly pale; the hind wings are very pale gray, smoky at the base; with a broad marginal smoky band, which contains a pale blotch about the middle, divided by a dark wing-ray, and a smaller light spot is very faintly visible near the tip; there is also a dark gray, well defined discoidal spot, and a distinct narrow waved smoky line just before the marginal band, fringe pale; the head and thorax are gray, the body whitish gray. The species varies slightly in the intensity of its colouring and

in the marginal band of the hind wings; in one of my specimens this is scarcely darkened.

The caterpillar has been described by Treitschke and Freyer, and figured by Hübner. Although it is not uncommonly found, in some countries, on *Artemisia* in September, I am unable to find a detailed description, so translate Treitschke. The larva may generally be found in the autumn on the field mugwort (*Artemisia campestris*) at the time when this twiggy plant is on bloom; it is yellowish green, with the dorsal and subdorsal lines blackish; its whole surface is covered with small black dots and fine blackish streaks, with many black hairs proceeding from each dot, which form, as it were, small tufts; the head is reddish brown, spotted with black. It also varies to green at the sides, the ground colour being gray; these are divided by a white lateral stripe; it remains yellow above, otherwise like the ordinary form. It undergoes its transformation to the pupa state in a slight and loose cocoon either in the earth or amongst the debris of its food-plant. The pupa is slender, reddish-brown and greenish on the wing-cases.

The moth appears on the wing in May, June, July, August and September—all these months being given by different authorities consulted; whether it is double-brooded, or, like many of its congeners, uncertain as to its appearance, seems doubtful—probably only the latter, though Heinemann refers distinctly to the two broods. Professor Hering says—"very capricious in its appearance, rare in some years whilst in others very common." Thus the double-brooded theory has probably arisen from the uncertainty of its appearance in varied localities; but if it be true that the larvæ only feed on the flowers and seeds of mugwort, we can scarcely have more than one distinct brood, though the time of its duration in the pupa state may be variable, as we know to be the case with many other *Lepidoptera*.

On the Continent this species is very widely distributed, and is not rare, though Britain is probably its extreme northern limit in Europe. Dr. Staudinger, in the Staudinger-Wocke 'Catalog,' says:—"Europa centralis (exceptus Batavia et Belgica); Livonia; Gallia meridionalis; Pedemontium; Turcia septentrionalis; Rossia meridionalis; Altaï Montes." Guenée says:—"Autriche, Hongrie, France méridionale,

Angleterre." Whilst Heinemann widens into—"Verbreitet bis Nord-deutschland, aber zerstreut."

As to its occurrence in Britain there is some doubt. It is figured by Curtis and Wood, included in Stephen's Museum Catalogue of British *Lepidoptera*, and described in Stainton's Manual; all on the authority of the Cumberland specimens; but in Doubleday's list it never got further than the 'Reputed British Species,' and in consequence was unnoticed in Newman's 'British Moths.'

In the 'Entomologist' for February, 1875 (Entom. viii. 42), Mr. J. B. Hodgkinson endeavoured to show cause against *Scutosa* being deleted from our lists, but with, I am afraid, but little if any immediate success; however, this species has lately been brought prominently forward by the news of its re-discovery in Norfolk, and the history of the four or five specimens taken in Cumberland, more than forty years ago, will now be read with increased interest. I have taken some trouble to learn more of these old, and, I believe, thoroughly genuine captures. Mr. Rothwell has supplied me with every information, and writes me that, "being a diligent collector of *Lepidoptera* when at school in Cumberland, I well remember taking many specimens which created quite a commotion amongst the collectors of Carlisle and the neighbourhood—Mr. Hodgkinson, sen., Mr. Heysham, Mr. Cooper, &c.; and doubtless the species you refer to (*Scutosa*) was one of them." He especially mentions the "Bee Sphinx (*Bombyliiformis*), the green Forester (*Staticea*), and the Portland moth (*Præcox*)."

After some further correspondence Mr. Rothwell informed me that he had "turned up" three boxes of his old collection, and very kindly invited me to inspect them. This I did; and though neglected for upwards of forty years I found a by no means dilapidated collection, which contained a number of really good species, especially amongst the *Noctuæ*; but no *Scutosa*. This was disappointing; but the information elicited quite satisfied me of the authenticity of Mr. Hodgkinson's history, who, from his acquaintance and connections with the captors and localities, was fully justified in championing the British connections of this species. I showed Mr. Rothwell specimens of the moth, which he failed to recognise distinctly,—rather an expected

occurrence, considering the lapse of time; but he said, "It looks like one of the moths I used to take flying about the mugwort that grew so plentifully on the sandhills, about half a mile from the coast." This was circumstantial evidence, indeed, said as it was in ignorance of the species being a day flyer, and having no idea of the food-plant of its larva. The Cumberland locality, especially rich in entomological specimens as it was, has been overtaken by the march of improvement,—the port of Silloth now occupying the ground.

Though the larva is also said to feed on the common mugwort (*Artemisia vulgaris*), *A. campestris* appears to be its special pabulum. This plant has a very restricted range in Britain, being wholly confined to sandhills. Watson, in his 'Cybele Britannica,' only gives it as an inhabitant of one, and doubtfully of three, of the eighteen provinces into which Great Britain is there divided. Babington says—"Sandy heaths in Norfolk and Suffolk; rare." Hence of all districts we might expect these eastern counties to produce *Scutosa*, and it is from Norfolk that the capture of two specimens has lately been recorded by Mr. Thornthwaite (Entom. ix. 18; x. 99); and, as an entomologist so experienced as Mr. C. G. Barrett is satisfied with their *bonâ fides*, it is needless to remark further on these recent captures. Though the occurrence of *Scutosa* at light seems rather at variance with the known habits of the species, still the *Heliothidæ* is a most uncertain genus in many respects.

The figure is from a series in my collection, taken in Morocco by the late Mr. Trovey Blackmore.

Maldon, April, 1877.

ON THE FORMATION OF A COLLECTION OF FOREIGN LEPIDOPTERA.

By W. F. KIRBY.

Author of 'A Manual of European Butterflies,' 'A Synonymic Catalogue of Diurnal Lepidoptera,' &c.

WHEN I first commenced the study of Entomology I began, as I suppose is the case with most beginners, by collecting insects of all orders, especially the larger and more striking species; but, after making the acquaintance of

several entomologists, I gradually devoted my attention to British *Lepidoptera* almost exclusively, not, in the first instance, from any special predilection, but because my friends neither cared for nor could give me any help with the other orders, nor could I obtain the books required to help me to work them out without other assistance. Having thus acquired an elementary acquaintance with British *Lepidoptera*, I removed to London, where, finding both collections and libraries within my reach, I determined to apply myself to the study of European *Lepidoptera*, then wholly neglected in England; and at the same time considerably extended my acquaintance with foreign *Lepidoptera* also. Since then I have had the entomological collection of the Royal Dublin Society (perhaps the third best public collection in the kingdom, those of the British Museum, in London, and the Hope Museum, at Oxford, being incontestibly the two first) under my charge for some years, which has added much to my experience. As it is not very easy for beginners commencing the study of European or Exotic *Lepidoptera* to acquire much practical information respecting them, in consequence of the want of good introductory books, and the very scattered form in which much of the literature of the subject is published, I thought that a few papers, pointing out the best means of forming a collection, the most useful books, &c., and giving a general account of the principal families of *Lepidoptera*, might not be uninteresting to some, at least, of the readers of the 'Entomologist.'

The *Lepidoptera* are so large an order, comprising at present at least 30,000 or 40,000 described species, that few can afford time, money, or cabinet room, to attempt to form a collection of the whole. Perhaps it is better to begin by collecting all that you have an opportunity of obtaining, until you have formed a preference for some particular group, and then to devote your attention exclusively to that; or, you may confine your attention to the productions of one particular country, either because you feel a special interest in it, or because you have opportunities of obtaining specimens from thence. Many British Lepidopterists form collections of Continental *Lepidoptera* for the purpose of comparison, and in this case it is of the utmost importance to obtain correctly-named types. Other entomologists may like to form a

collection containing representatives of the principal families or genera of the *Lepidoptera* of the world.

Many of the modes of collecting insects in use in England are equally efficacious abroad; but the most convenient way of collecting and bringing home a large number of specimens is by means of papers, which should be proportioned to the size of the insects they are to contain. These are prepared by folding a square piece of paper diagonally, and then doubling over one of the edges, leaving a sort of triangular envelope, open at the top. When the insect is dead (for only one should be put into each paper) the wings are pressed together over the back, and it is dropped into this envelope; the top is then folded down, and the papers can be then packed away in a tin or wooden box (not too tightly, and a little cotton-wool on the top may be recommended). They will travel safely, care being taken to keep camphor or some other strongly-smelling substance in the box to drive away mites. Of course it is better to set insects at once, if you have facilities for so doing. Experience alone will teach the best localities and modes of collecting in each country. Those who have friends abroad, or who have an opportunity of visiting foreign countries, may collect for themselves, or get others to do so (and it may here be mentioned that many of the greatest rarities have been sent home by missionaries); but those who are not so fortunate must obtain their specimens by purchase or exchange.

In seaport and other towns boxes of insects are occasionally offered for sale by soldiers or sailors, and though generally containing only common species, often in poor condition, yet they are always worth examining, as the reverse may happen to be the case, or a single specimen may chance to be among them worth all the remainder. Entire collections are also offered for sale, either privately or by auction; but it is not advisable to buy insects in this manner, without having had an opportunity of inspecting them beforehand. The value of insects in lots may generally be estimated as not more than that of the perfect specimens in it; for although it is better sometimes to buy an imperfect specimen of an insect difficult to get, or which you may require as a type, it is much better not to fill your drawers with broken or faded specimens of common species, unless

you require them for microscopical or structural examination; nor (if money is any object) can it be recommended to pay fancy prices for the first specimens of some grand new species which arrive, unless from some out-of-the-way place not likely to be soon revisited by a collector.

Foreign *Lepidoptera* may also be purchased from the dealers whose advertisements are published in the entomological magazines, or from the Natural-History agents, bird-stuffers, and dealers in curiosities, whose shops and offices are to be met with in various parts of London, but more especially in Great Russell Street, and the streets between this and Oxford Street. Mr. Marsden, of Gloucester, is at present the chief importer of European *Lepidoptera*.

Wealthy entomologists frequently send collectors abroad at their own expense, and thus receive large numbers of specimens. Opportunities sometimes occur for exchanging specimens with entomologists residing abroad, when specimens may readily be obtained from the Continent, North America, &c.

If all the insects in a collection are re-set in a uniform manner, it will very much improve its appearance. Under sides are exceedingly important in butterflies, but are often neglected.

The most useful introductory book for a beginner is Chenu's 'Encyclopedie d'Histoire Naturelles: Papillons.' This is mainly a cheap French abstract of Doubleday and Hewitson's great work, the 'Genera of Diurnal Lepidoptera,' now out of print and very scarce, the last few copies remaining at the publisher's having been destroyed in the great fire at Paternoster Row some years ago. Chenu's work contains butterflies and *Sphinges*, and is crowded with woodcuts. There is a second volume on moths, but it is too inaccurate to be recommended.

More advanced collectors will require other books, but, in the absence of monographs, it is difficult to know what to recommend. There is a Catalogue of Diurnal *Lepidoptera*, by the present writer, which is the latest compendium of this group; but it contains no descriptions. Walker's List of the *Lepidoptera Heterocera* of the British Museum, thirty-five parts (varying in price from three shillings to seven shillings per part, the parts being sold separately), will be found the

most comprehensive work on the moths yet issued. It contains descriptions as far as the end of the *Pyralidæ*, the *Micro-Lepidoptera* being much less fully treated; but no plates. It is divided as follows, being paged in seven sections: 1—7, *Bombyces*, &c.; 8, *Ægeriide* and *Sphingidæ*; 9—15, *Noctuæ*; 16—19, *Deltoideæ* and *Pyralidæ*; 20—26, *Geometridæ*; 27—30, *Micro-Lepidoptera*; 31—35, Supplement. There is a small work by Morris (without plates) on the 'Described Lepidoptera of North America,' but only one part has been published, containing butterflies, *Sphinges*, and *Bombyces*. There is another, by Ross, on the 'Butterflies and Moths of Canada,' with woodcuts; but it is very incomplete. There are many large and expensive illustrated works on European and foreign *Lepidoptera*; but the best of the cheaper publications on European *Lepidoptera* are probably Staudinger and Wocke's 'Catalog der Lepidopteren des Europæischen Faunengebiets' (without descriptions), Von Heinemann and Wocke's 'Schmetterlinge von Deutschland' (no plates), and Berce's 'Lépidoptères de la France.' The latter has some good coloured plates, which will be found very useful; plain copies are not to be recommended, as the butterflies figured are not described in the text. There are also several popular illustrated works on German *Lepidoptera*, with which I am not sufficiently acquainted to express any opinion. Works treating of separate groups will be noticed in subsequent papers.

Zoological Department, Royal Dublin Society,
February, 1877.

A SIX WEEKS' ENTOMOLOGICAL TOUR IN SWITZERLAND.

BY J. C. W. TASKER.

THE tenacity with which English collectors confine themselves to British species, and pay fabulous prices for doubtful specimens of the rarer kinds, which have probably reached the shores of Old England without the aid of their wings, is surprising to an entomologist revelling in the good things which this country so readily offers for his cabinet.

With the hope of inducing some brother *chasseurs* to

come and share the treasures which for eight years I have been enjoying, I pen a few lines suggesting a six weeks' entomological tour. This would, I doubt not, at about the same expense as a similar trip in England would cost, just double the enterprising *voyageur's* collection of butterflies alone, and at the same time open out to him some of the finest scenery in the world.

Starting from Paris by the 8 P.M. train, you are landed by the Dijon and Pontarlier route at Lausanne (Hotel Faucon) at 10.25 A.M., and at Aigle 1.14 P.M. the next day, for a cost of about £3 from Paris.

The cost of living *en pension* in this country, at the places which an entomologist would naturally select, averages from six to eight francs (five or seven shillings) a day, wine, candles and service being extras, but not heavy items. Living *en pension*, however, necessitates at least a week's residence in the same hotel, otherwise hotel prices are demanded, which would raise the amount to ten or sixteen francs the day. At almost all the places mentioned below an agreement can be made on arrival to be placed *en pension*.

I. I should recommend our *chasseur* to make direct for Aigle. He can book his place direct from Paris to Lausanne, and then secure a fresh ticket for Aigle. There are two very good hotels in the town of Aigle (Beau Site and Mon Sejour, *pension* six and a half francs), and one much more luxurious but more expensive just outside the town. In any of these hotels he could locate himself most comfortably for a week or more, and make short expeditions by train to fresh hunting-grounds, besides the numberless walks that can be accomplished in the immediate vicinity.

II. I should next recommend a week's *pension* (five and a half francs per day) at the Hotel des Alpes, Sepey, which is a marvellous place for night-work with light, as well as abounding in promising hunting-grounds. If only my friend Madame Fashnach, the landlady, would put the *chasseur* in the same chamber that I occupied last spring, he would have a perfect storm of rarities round his petrole lamp at midnight. The high road up from Aigle to Sepey (two and a half hours) is one of the most wonderful hunting-grounds I ever visited. There is no knowing what you may catch there. On fine

days butterflies abound in large numbers. The Hotel des Alpes is a small roadside inn, and offers really cleanly, good sleeping accommodation, excellent, wholesome, honest food, and the greatest civility in attendance; I often stay there with my family. A diligence runs daily from Aigle through Sepey, on to Chateau D'Oex and Rossinieres, so there is no difficulty about forwarding luggage by this route; in fact throughout Switzerland you can forward your luggage with safety and at a cheap rate by the post, trusting to your knapsack *en route*.

III. The following week's expedition may very well be omitted if time does not permit of its being carried out. But some valuable *Erebias* may be secured in the neighbourhood of Rossinieres, and the route from Sepey is one of the most beautiful in this part of Switzerland. To go to Rossinieres your luggage should be sent by the Chateau D'Oex diligence to Les Moulins, whilst you walk over the Comballaz down to Rossinieres from Sepey in about three hours and a half, and on arrival send for your luggage. At Rossinieres the Grand Châlet, the largest châlet in Switzerland, affords most excellent food and accommodation (*pension* six francs). It would be well to write beforehand to Madame Raymond, the landlady, as the Pension is much frequented by English, and often full. The return journey may be made on foot over the Col de Jaman, in five to six hours, down upon Montreux (a splendid walk), in time to take the last train to Sion or Sierre.

IV. This route may also be omitted, the next (No. V.) being the most important. Take the train at Montreux or Aigle for Sion: if arriving late in the day stop at Sion, and go on the next day up the Val d'Herens to Evolena; sleep there, and on the following day to Arolla. Up this valley *Parnassius Mnemosyne* and many other rarities, as *Chionobas Aello*, are taken. The valley is very different in scenery from most of the other lateral valleys of the Rhone, and well worth a visit. A whole day would be well spent at Arolla, and by a good walker the return journey may be accomplished in one day easily enough to save the last train from Sion on to Sierre.

V. Taking the last train from Montreux, Aigle, or Sion (as the case may be) you arrive at Sierre in time for the

diligence on to Visp. Send your luggage on by post from Visp to Zermatt, which it will reach in two or at most three days. Sleep at Visp (Hotel Soleil). Start early in the morning to walk to St. Nicholas, as the first part of the journey is very hot. There is only a mule path to St. Nicholas, and care must be taken on leaving Visp not to select the wrong path; the rest of the route is perfectly plain. Half an hour after leaving Visp look out carefully for *Naclia punctata* and *Syntomis Phegea*. St. Nicholas is said to be one of the finest places in Switzerland for moths, and I should strongly recommend sleeping there; even a day or two spent there would not be thrown away. Next day a five or six hours' walk over a most splendid hunting-ground brings you to Zermatt. The Hotels Mont Rosa, Mont Cervin, and the Hotel on the Riffel, are all kept by my good friend Mr. Seiler, a pattern landlord, and his most obliging wife; and *pension* at the two former may be secured at from eight to nine francs per day. The Riffel Hotel is dearer, but a day or two should be passed there for the sake of the higher mountain species. The hunting-grounds around Zermatt are numberless—especially I would mention the Riffel, Gorner Gratt, and Schwarzensee.

By omitting routes III. and IV. the expedition could be compressed into a few days over the month. The Valley of Saas, branching off the Zermatt route at Stalden, is a splendid place for beetles, as also the Creux de Champ at the Diablerets, which may be easily reached from Sepey.

The month for Swiss butterflies is undoubtedly July, but unfortunately this is frequently an uncertain month in point of weather. The butterfly season extends from May to the end of August, but July is *the* month. Numberless other expeditions may be made to branch off the route I have proposed, but these are the localities best known to me as favourable. The route home may be left to the *chasseur* himself after he has learnt his ground, which I feel sure that he will be sorry to leave.

From this narrative some idea may be formed of the expense of the proposed tour, and to give a notion of the captures of butterflies that may be made I append to this a list of the Swiss butterflies that I have myself taken, and the localities arranged according to the districts above alluded

to in the communication. Where no number is affixed the species is found throughout the whole. The names are taken from Mr. Kirby's 'Manual of European Butterflies.'*

Papilio Podalirius. *P. Machaon*. *Parnassius Apollo*. *P. Delius*, iv., v. *P. Mnemosyne*, rare, iv., also on Gemmi. *Aporia crategi*. *Pieris brassicæ*. *P. rapæ* var. *ergave*. *P. napi* and its var. *bryoniæ*, rare, iv., v. *P. Callidice*, rare, v. (Rif. and Sch.). *P. Daplidice*. *Anthocharis Belia*, var. *Ausonia*, rare, v. *A. cardamines*. *Leucophasia sinapis*. *Colias Palæno*, rare, v. (Rif. Sch.), also Bell Alp and Furka. *C. Phicomone*, iii., iv., v. *C. Hyale*. *C. Edusa*. *C. Edusa* var. *Helice*, i., ii. *Gonepteryx rhamni*. *Melitæa Cynthia*, very rare, v., near Riffel Hotel. *M. Artemis*. *M. Artemis* var. *Merope*, rare, v. (Rif. and Sch.). *M. Cinxia*. *M. Phæbe*, i., iv., v. *M. Didyma*. *M. Athalia*. *M. Dictynna*. *M. Parthenie* var. *Varia*. *Argynnis Selene*, once only. *A. Dia*. *A. Amalhusia*, i., ii., iii. iv. *A. Euphrosyne*, i. *A. Pales*, i., Les Plans, iii., v. *A. Pales* var. *Isis*, iii., Corgeon, v. *A. Ino*, rare, ii., iii. *A. Lathonia*. *A. Aglaia*. *A. Niobe*, iii., v. *A. Niobe* var. *Eris*, iii., v. *A. Adippe*. *A. Paphia*. *A. Paphia* var. *Valezina*, i., v. *A. Pandora*, in Valley of Sixt. *Grapta C-Album*. *Vanessa polychloros*. *V. urticæ*. *V. Io*. *V. Antiopa*. *V. Atalanta*. *Pyrameis cardui*. *Limenitis Sibylla*. *L. Camilla*. *Nymphalis populi*, rare i., one near Sepey, iii., Col de Philisma. *Aputura Iris*. *Melanagria Galathea*. *Lasiommata Mæra*. *L. Hiera*, very rare, i. *L. Megæra*. *L. Ægeria*. *L. Dejanira*, i., abundant near Hotel des Bains, Aigle, at the end of June. *Hipparchia Proserpina*, i. *H. Hermione*, i., ii., v. *H. Semele*, i., v. *H. Phædra*, i., ii., v. *H. Cordula*, i., ii., v. *H. Lycaon*, v. *H. Janira*. *H. Hyperanthus*. *Cænonympha Iphis*, i., Les Plans, ii., Chamossaire. *C. Arcanius*, twice at Veyteaux. *C. Philea*, iii., Col de Philisma, iv., v. *C. Pamphilus*. *Chionobas aello*, very rare, iv., v. *Erebia Melampus*, ii., Chamossaire, Comballaz, iv., v. *E. Mnestra*, rare, v., on road to Riffel. *E. Pyrrha*, iii., Col de Philisma, Corjeon, Rubli. *E. Ceto*, iii., iv., v. *E. oeme*, between ii. and iii., once only. *E. Medusa*, i., Glion and Rochers de Naye. *E. Pirene*, ii., Diablerets and Chamossaire. *E. Alecto*, very rare, v., Gorner Gratt. *E. Manto*, v. (Rif. and Schwar).

* I. Aigle district from Martigny to Vevey. II. Sepey. III. Rossinieres. IV. Val d'Herens. V. Visp to Zermatt. Rif. = Riffel. Sch. = Schwarzensee.

Tyndarus, iii., iv., v. *E. Goante*, iv., v. *E. Pronœ* var. *Arachne*, iii., at Rossinieres. *E. Medea*. *E. Ligea*, ii., iii. *E. Euryale*, v. *Nemeobius Lucina*. *Thecla betulæ*, i., ii., iii. *T. spini*, i., ii., iii. *T. W-Album*, i., ii., iii. *T. ilicis*, i., ii. *T. acacia*, i., near Aigle, very rare. *T. quercus*, i., rare. *T. rubi*. *Chrysophanus virgaurea*, iv., v. *C. Eurydice*, iii., v. *C. Eurydice* var. *Eurybia*, rare, v. *C. Gordius*, rare, v., and in Val d'Anniviers up to St. Luc. *C. Dorilis*, ii., iii. *C. Phlæas*, i., v., rare. *Polyommatus bæticus*, i., three close to Aigle, 1876. *P. Tiresias*, i., one on Sepey Road, 1876. *P. Ægon*. *P. Optilete*, v., on road to Riffel. *P. Pheretes*, v., on road to Riffel, just on last ascent up to Hotel. *P. Orbitulus*, iv., v. *P. Medon*. *P. Eros*, v. *P. Icarus* and var. *Icarinus*, i., iii. *P. chiron*, i., Les Plans, v. *P. Adonis*. *P. Corydon*. *P. Dorylas*. *P. Damon*. *P. Donzelii*, rare, v., larch woods to right of hotel at Cervin, end of July. *P. Argiolus*, i. *P. semiargus*, rare, i. *P. Cyllarus*, i., ii., iii. *P. Alcon*, rare, i., Bex, iv. *P. Arion*, ii., iii. *Pyrgus malvarum*, i. *P. lavateræ*, i., ii., v. *P. carthami*? (locality unknown). *P. Alveus*. *P. malvæ*, and var. *lavateræ*, i., rare. *Nisoniades Tages*. *Pamphila thaumas*. *P. Sylvanus*. *P. comma*. *Cyclopides Paniscus*, i., Les Plans, ii., Chamossaire.

The varieties approaching *Athalia* are something extraordinary: variations occurring according to the different heights and localities in which they are taken, each valley seems to present some difference in size or marking. *Apatura Ilia* I have never taken, but I have seen a specimen taken by my butcher near Aigle.

Aigle, Canton de Vaud, La Suisse, Feb. 1, 1877.

NOTES ON CRAMBITES, OBSERVED DURING THE YEARS 1874, 1875, 1876.

By WALTER P. WESTON.

Crambus alpinellus, Hb.—Though not appearing in any quantity, there seems to be no cause for apprehension lest this rare and local species should temporarily disappear. It has, I understand, been taken each season, in its old locality, in the neighbourhood of Portsmouth.

Crambus verellus, Zk.—Since the capture at Folkestone, in 1872, by Mr. C. A. Briggs, of the specimen (now in the collection of Mr. Howard Vaughan) on the authority of which the species was introduced into the British lists, two more specimens have occurred in the same locality: one captured by myself by beating, on the 22nd August, 1874, when collecting in company with Mr. Briggs; and another, taken by him at sugar, in 1875. Now that the *Micro-Lepidoptera* seem to be getting their share of attention we may hope that this species will turn up in tolerable plenty. From the capture of three specimens in different seasons there can be no doubt of its constant occurrence at Folkestone. Nothing is known of its earlier stages, though in all probability the larva feeds on the lichens growing on stones and old tree trunks.

C. sylvellus, Hub., = *adipellus*, Tr.—A fine series of this local species was secured last season, by Mr. E. G. Meek, in the Norfolk fens.

C. uliginosellus, Zell.—Also commonly found by Mr. Meek in company with the preceding species, but the specimens were somewhat worn.

C. latistrius, Haw.—Has occurred sparingly at Folkestone; a new locality for this species.

C. tristellus, W. V.—The life-history of this species has been elucidated by Mr. W. Buckler (E. M. M. xiii.), who has succeeded in rearing it from the egg. From his observations it appears that *Tristellus* is a very voracious feeder, and fully capable in plentiful seasons of doing considerable damage to grass lands. The favourite food of the larva appears to be *Aira flexuosa*.

C. paludellus, Hub.—A few were taken by Mr. Meek in the Norfolk fens, in 1876; but the species was by no means common. Mr. Tugwell also found it sparingly there the same season.

Anerastia lotella, Hub.—Another insect whose early history has been elucidated by Mr. W. Buckler. The larva feeds on the plant-stems of *Psamma arenaria*, near the roots, and is often buried by the shifting surface of the sands.

Ephestia pinguis, Haw.—Occurs plentifully in Regent's, Hyde, and Finsbury Parks, London. It emerges from the pupa late in the afternoon; and specimens may be found on

the tree-trunk drying their wings from four till half-past eight, or until it is quite dusk.

Ephestia elutella, Hub.—Mr. W. Buckler records having bred his species from larvæ feeding on dog biscuit and an old cloth coat. They feed through the winter, change to a pupa in March or April, and the perfect insect emerges in the early part of July. Mr. Buckler fully describes the larva and its habits (E. M. M. x. 213).

E. artemisiella, Steph.—Has occurred sparingly in South Wales, in 1876.

Cryptoblabes bistriga, Haw.—Specimens were taken at Folkestone last season.

Gymnancycla canella, W. V.—Several specimens of this insect have been bred from larvæ collected on the coast, feeding in the stems of *Salsola kali*. Most of the imagos emerged the following spring; but some remained in the pupa state until the second season.

Phycis betulella, Goetz.—Has been taken in 1876, at West Wickham and Folkestone.

Pempelia genistella, Dup., = *davisellus*, Newman.—This species appears to have been described several times before it was named by the late Mr. Newman, in honour of its discoverer in England. The late Mr. Doubleday (Entom. viii. 41) mentions having sent specimens to Dr. Staudinger, who returned them as being without doubt the *Nephopteryx genistella* of Duponchel. Herrich-Schäffer next described and figured it as *Ulicella*, from specimens taken in Andalusia. Mr. Doubleday—having sent a type to Professor Zeller, to whom it was unknown—described it for the third time as *Albiliniella*, in the Stett.-e-Zeit., 1859, p. 223. In order to place our nomenclature as much in accord as possible with the continental lists Duponchel's name must be adopted, and the synonymy will stand thus:—

Genistella, Dup.

Ulicella, Herr.-Sch.

Albiliniella, Doub.

Davisellus, Newman.

An account of its life-history is published in the 'Entomologist' (Entom. vii. 132) by Mr. Moncreaff, who also states that the imago is figured in Morris's 'British Moths' as *P. palumbella*, with which I am unable to agree. In his

description of the species figured by him, Morris gives as localities, "York, Lewes, Manchester, Worthing, Bristol, Birkenhead;" and its situations, "heaths and moors;" thus clearly showing that his figure refers to the *P. palumbella*, W. V., and not to *Davisellus*, Newman, which was unknown to him.

Rhodophæa suavella, Zinc.—Mr. W. Buckler (E. M. M. xii. 13) describes the habits of the larva. It feeds not only on sloe, but also on whitethorn bushes, and is not scarce in the stunted hedges along the railway banks around Esher, where in some seasons the perfect insect occurs commonly.

R. marmorea, Haw.—Mr. Buckler (E. M. M. x.) records having bred this insect, and fully describes the larva, which feeds on dwarf sloe, generally choosing low stunted bushes, and spinning the leaves together in a web, so as to conceal its operations from view. It pupates among the leaves of the food-plant, and remains in that state about four weeks. It is much scarcer than the preceding species, and, as far as I am aware, does not occur in the neighbourhood of London.

1, Duncan Terrace, N.

CIDARIA FULVATA, VAR.

By F. BOND, F.Z.S.



CIDARIA FULVATA, var.

THIS variety of a very beautiful, though common, species was taken in the Isle of Man a few years ago, by a friend of the late Mr. E. Hopley, and came into my possession, shortly after his lamented death, on the dispersion of his fine collection of British Lepidoptera. I have seen many hundreds of this insect, but never saw a variety before. I believe a similar specimen has been taken by the gentleman who captured my insect.

DESCRIPTIONS OF OAK-GALLS.

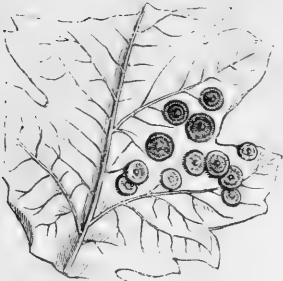
Translated from Dr. G. L. MAYR's 'Die Mitteleuropäischen Eichengallen.

By EDWARD A. FITCH.

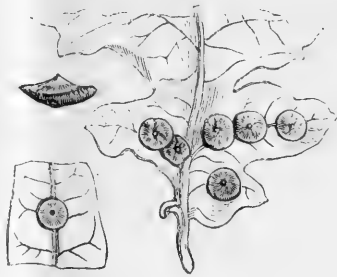
(Continued from p. 89.)

Fig. 64.

Fig. 65.



NEUROTERUS FUMIPENNIS.



NEUROTERUS LEVIUSCULUS.

64. *Neuroterus fumipennis*, Hart. (*Spathogaster varius*, Schenck).—This gall is found, according to Schlechtendal, on *Q. pedunculata*, and is distinguished from the former by its margin being more or less raised, its smaller size,—only reaching to a diameter of three millimetres,—and by its markedly thinner appearance while still on the leaf: Von Schlechtendal also writes me that this gall is always of a more reddish hue, and that he has never met with a specimen showing the yellow colour of *N. lenticularis*. It is scantily covered with short radiating hair, of a rusty red, and after falling it swells considerably at its under side. Schlechtendal obtained the gall-flies, which differ considerably from the former species, between the end of April and the middle of May.—G. L. MAYR.

This species is moderately common, and widely distributed in Britain, though nowhere so abundant as *Lenticularis*. I have collected many hundreds of the galls, but never yet succeeded in breeding the makers; they are later than the former species—hence probably my failure, as it is difficult to keep the spangles moist without moulding, during their growing or swelling state, through the winter; this gall, like the former, makes a home for *Synergus Tscheki*. Marshall, in his descriptions of the British *Cynipidæ* (E. M. M. iv.), seems

to have confounded this species with *Spathegaster tricolor* (l. c. p. 147). The only oak spangles I have ever met with on the upper side of the leaf have belonged to this species.—E. A. FITCH.

65. *Neuroterus læviusculus*, Schenck (*N. pezizæformis*, Schlechtendal).—Both insects and galls from both authors lie before me, so that I am in a position to judge of their identity. This gall only differs from the above-mentioned species, viz., *N. lenticularis*, as follows—that it is smaller, and is more sparsely covered with hairs. It sometimes may be found on the upper side of the leaf. In all the examples I have now at hand there is in the middle a more or less well-defined boss, whilst in the gall of *N. lenticularis* no distinct boss occurs; its margin is often upturned, through which it sometimes becomes difficult to distinguish it from the gall of *Fumipennis*. Schlechtendal states that the fallen galls are stout above, but only very slightly arched below, but the fallen galls received from him—those showing the exit hole of the fly—and those from Von Heyden, in his opinion Schenck's type, are both as stoutly arched on the under side as on the upper; at all events yet wider observations are necessary to accurately differentiate the three last species of galls. Herr v. Schlechtendal bred the gall-flies at the end of February (Schlechtendal has it "ende Januar"), from typical galls kept in a hot room.—G. L. MAYR.

For my first authentic acquaintance with the closely-allied galls of this species I have to thank Miss E. A. Ormerod, who kindly sent me specimens from Kew (Surrey) and called my attention to their specific value; since then I have recognised specimens both in Essex and Suffolk, and when the difficulties of discrimination are surmounted I have no doubt it will be found to be generally distributed;* I had previously considered the galls to be immature *lenticularis*. The following may help to identify the three species:—Suppose we take the nearly flat, deflected, brown pubescent galls of *Lenticularis* as the type; now from these *Fumipennis* may soon be learnt to be distinguished, but the difference is hard to depict without the galls themselves: however, *Fumipennis* differs much from the type species, both in colour and shape;

* Mr. Rothera has met with these galls in the neighbourhood of Nottingham.—E. A. F.

it is green, with a carmine margin, or wholly of a deep red colour; it is almost smooth (slightly wrinkled), and on the upper side there are indistinct radiations from the centre to the circumference; it is without the stellated hairs, which are so conspicuous on *Lenticularis*. Again, in shape, while *Lenticularis* is highest in the centre, and gradually flattened towards the periphery, *Fumipennis* is most distinctly raised at the outer edge, and the gall is consequently cupulate, with the exception of a small papilla in the centre; superficially *Fumipennis* is smaller than *Lenticularis*. *Læviusculus*, the third species, is intermediate between the two, having the form and size of *Fumipennis*, but is rather thicker than that species, having in shape a great resemblance to a plain pearl shirt-button, in miniature, with a distinct wart in the centre, and the colour and colorational pattern of *Lenticularis*, with the exception that it is less pubescent, and the stellated hairs are very distinctly shorter and much less conspicuous than in that species. (The accompanying figures, which exhibit the three galls in section, will perhaps give a more distinct idea of their respective forms.) *Lenticularis* galls are gregarious,

1 2 3



1. *N. lenticularis*. 2. *N. læviusculus*. 3. *N. fumipennis*.

whilst *Fumipennis* and *Læviusculus* are solitary; hence we never find the latter so crowded, and consequently distorted, as is frequent with the commoner species. I should say that the above remarks refer more particularly to the galls as seen in November, that is just before their decidence. I had hoped here to have included some collected notes on the synonymy of these species, but that may be deferred; however, I may say that from Schlechtendal's descriptions of the galls in the 'Entomologische Zeitung,' his *Fumipennis* seems more to accord with *Læviusculus*, whilst his *Pezizæformis* description might well stand for *Fumipennis*, as understood by me; e.g., he says of *Fumipennis*, "mit sehr kurzen braunen Sternhaaren besetzt," and of *Pezizæformis*, "flach mit

sparsamer Behaarung oder ganz kahl . . . die Oberseite ist fein radial gestreift." *Callimome sodalis* was bred from these galls by Schlechtendal in March and April of the second year.—E. A. FITCH.

ISOCOLUS SCABIOSÆ: A CYNIPIDEOUS GALL-MAKER NEW TO BRITAIN.

By EDWARD A. FITCH.



ISOCOLUS SCABIOSÆ.

WHEN Dr. Giraud described this species he had but Hartig's arrangement to follow; this he did faithfully, and in consequence this gall-fly was described by him as *Diastrophus scabiosæ*. Hartig's classification was in many respects a very natural one; but the generic distinctions were made to rest on very superficial and unsatisfactory characters. The arrangement of the *Cynipidæ* has since been elaborated by Dr. Förster; however, I must say, I have not been able to grasp his synopsis at present, but the divisions must, I am afraid, always be very difficult and involved, the insects themselves having a most marked resemblance both in pattern and structure. This refers to *pseudous* and *inquilinous* genera alike; but amongst the productions of the gall-makers we have some very natural allies, which have served, and probably will continue to do so, both in the differentiation of species and erection of genera. Förster seems altogether to have ignored the life-histories; but

respecting the imagos his synopsis is certainly very elaborate, —possibly more elaborate than clear, as there are many gall-making species which I am unable to relegate to any of his divisions; and, unfortunately for his successors, the insect now under notice is made to serve as a type for two widely-separated genera,—*Isocolus* and *Eubothrus*; were it a solitary instance it might possibly be accounted for by the fact that Förster understood Giraud's species to include both the gall-maker and the *Aulax*, a genus now divided, partly *inquilinous* and partly gall-producing. The dwellers in the galls of *Rhodites* and *Diastrophus* bear a most remarkable resemblance to their hosts; in fact it requires great care to distinguish them, differing as they do in many instances in but a few secondary structural characters, the colorational pattern being identical. However, this is not a note on classification; so suffice it to say that *Scabiosæ* is very properly separated from *Diastrophus*, but it is impossible to give the characters concisely. *Diastrophus* is, as far as we at present know, limited to gall-makers on *Rubus* and the allied *Potentilla*. *Aulax* is often an inmate in its galls, and resembles it most closely, as has been said. We only have one species in Britain, which galls the stems of the dewberry (*Rubus cæsius*) and its allies; but our *Potentilla* gall, the maker of which is now referable to *Aulax*, may possibly have a closer relation: the *inquiline* has been described as the maker of the gall more often than otherwise. Giraud's diagnosis of our species is as follows:—"Niger, breviter pubescens; geniculis, tibiis tarsisque ferrugineis; capite thoraceque dense coriaceis, opacis; facie et pleuris aciculatis. Areola nulla. Ant. mas 14, fem 13 art. Long, 2—3 mm." (Verh. z.-b. Gesell. Wien. ix. 368). For the enlarged description reference must be made. The specimen I have bred agrees with his description, with the exception that the areola (second cubital) is well defined,—he says, "areola nulla:" this may point to the *inquiline*, of which, should I obtain fresh galls and breed, I may have more to say hereafter; as it is, Giraud's description must be left as sufficiently correct. The gall—which occurs on the leaf-stalk of the *Centaurea scabiosa*, the species with the pinnatifid leaves—consists of an irregular oviform swelling on the midrib, situate at the base of the leaf, where it shoots forth from the petiole; it is but

slightly lighter in colour than the leaf itself, which it resembles in structure and in the amount of pubescence: it is single-celled; but Giraud says it contains "Un grand nombre de petites cellules disposées sans ordre." This specimen was unmistakably inhabited by the inquilines; but whether all were so it would be difficult to say. For this addition to our Fauna we are indebted to Mr. W. C. Boyd, who found the gall at Topley Pike, near Buxton, Derbyshire, in the autumn of 1875, and kindly sent me the specimen from which I bred the producer. Dr. Giraud says it appears to be very local; but should it be again met with I should be very thankful for fresh specimens, as there is much about the species which is still unsatisfactory.

Maldon, Essex.

MELANOCHROISM, &c., IN LEPIDOPTERA.

By F. BUCHANAN WHITE, M.D., F.L.S.

I AM happy to meet so gallant a knight as Mr. Nicholas Cooke upon a field affording so much scope for discussion as that of variation in *Lepidoptera*, and gladly accept his challenge.

In the first place—if I read his remarks aright, and their meaning seems certainly plain enough—Mr. Cooke uses the term "natural selection" in a sense in which no one else does, namely, the selection of their partners by the female insects. This, if Mr. Cooke likes, is "sexual selection"; "natural selection" it certainly is not.

"Natural selection" may be defined as the weeding out of all but those individuals who are best fitted to survive in the struggle for existence, and this weeding (for the most part—like the majority of the universal mother's operations—a gradual process) is carried out by many and various agencies. It may happen that in certain districts dark forms of certain species have some advantages over their lighter-coloured brethren. By their more obscure colour they may escape detection by their enemies, and hence have a greater chance of being the means of continuing the species than the more conspicuous lighter-coloured individuals; or, in another district the very reverse of this may occur, and the advantage

be on the side of the light-coloured. For example, *Gnophos obscuraria* is dark on dark soils, light on light-coloured soils,—and why? This species always rests on or near the ground. On a pale soil the lighter-coloured individuals will escape detection, when those of a slightly darker tint will be seen and destroyed. No doubt not all the pale ones will escape, but more pale than dark ones will, and a majority of the broods will spring from pale parents. This will be continued generation after generation, till that exact shade of colour which experience shows is best fitted to secure protection is attained, and all the individuals in the district are of that tint. If a darker or lighter individual appear in a brood (and, by the laws of heredity, it is likely that such will sometimes appear) it will soon be weeded out. Let us now suppose for a moment that from some cause the soil, rocks, &c., of this district are changed from light to dark. What will follow, then, to our light-coloured race of *Gnophos obscuraria*? Circumstances will now favour the darker individuals; and instead of their being weeded out they will be preserved, and the light-coloured ones will perish; and this will continue till the dark-coloured race are alone in possession of the ground.* Now all this happens not by any premeditated act or desire on the part of the insects themselves, but by that law of Nature which gives the pre-eminence to those best suited to hold their own in that great struggle for existence which is going on all around us. What I have said is equally applicable to all the stages of existence,—egg, larva, pupa, or imago,—and shows how the variation, once established, is kept up and intensified *if found to be advantageous*.

But what is the exciting cause of this tendency to variation? I think it is (in some cases, at least) meteorological, that is to say, cold or heat, dryness or dampness, presence or absence of sunshine, &c. It has been proved experimentally that temperature has a very great influence in modifying the colour of insects,—to so great a degree, in fact, that broods so modified have been considered to be specifically distinct. Some of the melanochoic races may be due entirely to

* At the same time it seems worthy of note that a majority of the *very* pale varieties of the various European species of the genus *Gnophos* are usually of more southern distribution than the typical forms.—F. B. W.

meteorological causes, and not dependent at all upon natural selection.

Mr. Cooke suggests that the geological formation is a possible cause of variation, and I cannot say that it is not so; at the same time it requires proof. As for the occurrence of pale forms on chalk and other light-coloured formations, that is brought about by natural selection, not by the geological formation. The range of certain species may be confined to certain formations, but that is, perhaps, not due to the formation itself, but to the food-plants being confined to that particular formation. Still, however, plants common to various formations may on one formation acquire some chemical constituents that may make them, in this case only, suited to be the food-plants of certain species, and hence the range of the insect be restricted to that formation, though the food-plant is not. In the same way the food-plants may on certain soils affect the colours of the insects; but if it is so at all it is probable only in a few cases. The influence of the food-plant upon the colours of insects seems not to be very great, though there are a few species which are *theoretically* supposed to have become separated from other, closely allied, species by modifications induced by the food-plant. If my memory serves me, *Eupithecia pulchellata* and *E. linariata* are instances of this supposed influence.*

The history of the smoky varieties of *Tephrosia biundularia* is very interesting: they may, perhaps, be due to chemical influences on the food-plants. If such is the case it ought to be easy of experimental proof. (As this variety is still, I believe, nameless, I take this opportunity of suggesting for it the name *Delamerensis*. It is, of course, rather an aberration than a variety, taking these terms as defined by Dr. Staudinger.) This aberration and the ab. *Doubledayaria* (Mill.) of *Amphidasis betularia* are, however, exceptional cases, and cannot be considered as throwing much light on the origin of the majority of melanochroic forms.

The latter part of Mr. Cooke's paper (though of equal or greater interest) treats of a different subject, and one to which I also have paid some little attention. My investigations in

* Since this was written some facts have presented themselves to me which suggest the idea that *Ino statice* and *I. Geryon* may be instances of modification produced by different food-plants.—F. B. W.

this direction have chiefly been amongst the European *Rhopalocera*,* and seem to show that the specific differences in the genital armature are much greater in some genera than in others. When in very *closely-allied* species the structure is found to be *identical*, it seems to be questionable whether the species are really distinct. The value of the character in the genus or family must, however, be taken into consideration in forming a conclusion on that point.

Perth, April 4, 1877.

ON MELANISM AND VARIATION IN LEPIDOPTERA.

By W. PREST.

HAVING for some years taken great interest in melanism and variation in *Lepidoptera*, I should like to write a few lines on the subject. I am of opinion that we shall have to look still further than Mr. Nicholas Cooke seems to think for the true cause of melanism and variation, for I have no doubt that whatever the influence is which causes the one also affects the other. I do not think that either chemical fumes or coal smoke can have any influence in this district of Yorkshire, which is purely agricultural: we have very few tall chimneys and no coal pits nor chemical works; and yet we meet with many cases of variation, and some of melanism, in *Lepidoptera*. Take for instance the genus *Acronycta*: in *A. ligustri* the form we usually find is suffused with dark olive-green; we very rarely see the white-crested form. I took thirteen specimens of this species at sugar one season some years ago, and of these, ten were this olive-green type, with no white markings. Again, about Liverpool, the entomologists take or breed *A. menyanthidis* of a very pale form; those we take near York are nearly black, and the light form is very rare. *A. rumicis* also occurs nearly black at times with us. I have taken *A. leporina* for nearly twenty years, but never yet took the pale form near here; ours are all the variety *Bradyporina*. Chemical fumes and coal smoke cannot, in these cases, be the influencing cause. How is it that in the New Forest the female of *Argynnis Paphia* is

* If Mr. Cooke cares to see the result of my investigation, he will find it in a forthcoming part of the Linnean Transactions. The paper is at present, I believe, in the printer's hands.—F. B. W.

often taken nearly black (the variety *Valezina*), and yet in Lancashire and Yorkshire I never heard of a specimen occurring? Some years ago I took near this a very dark female *A. Aglaia*, but certainly not within miles of either large towns, tall chimneys, or even railways. Again, on the same ground where we take the dark form of *Acronycta menyanthidis* we take *Epione vespertaria*. Of this I have taken during the last twenty years, at odd times, four dark varieties, and, rather singular to say, all these were caught within fifty yards of the same spot, though in different seasons. I have bred hundreds, nay I may say thousands, of the ordinary type, but have never myself reared, nor heard of anyone else rearing, a variety of this species.

I will now take a case of true melanism. I have for the last eighteen or nineteen years been continually breeding *Eupithecia albipunctata*: about seven years ago I bred one specimen of a smoky black colour, without any markings or white spots, only with a blacker spot in the centre of superior wings; two years ago another specimen; and last year (1876) four specimens—all exactly the same form. Although I have taken the larva of this species in many localities, all these cases of melanism come from the same wood.

We take *Xylophasia polyodon* near York as black as, and I think even blacker than, any I have seen from Scotland. The dark markings on *Arctia lubricipeda* are more prone to radiation about York than in any locality I know. Of *Abraxas grossulariata* we have had all forms, from nearly all black to almost white; and I bred one two years ago semi-transparent. *Cidaria suffumata* is sometimes all dark rich brown. I have taken two specimens at York of *Cirrædia xerampetina*, both of the dark rich Manx form (var. *Unicolor*). Specimens of *Amphydasis betularia* have been bred, both black and intermediate, but these are exceptional. Of *Tæniocampa opima* I have specimens nearly black without markings, excepting outlines of stigmata and subterminal line. *Epunda viminalis* has in some years been very abundant, and most of them nearly black. I could give very many more cases, but I think I have named sufficient for my purpose.

From these facts I form my opinion that soil in its action

upon the food-plant has more to do with variation—heredity or otherwise—and melanism, than either chemical fumes or coal smoke. If the two latter, how is it that there are not in Lancashire cases of melanism in such insects as *Liparis salicis*, *L. auriflua*, *Cabera pusaria*, &c.?

I should like to hear the opinion of such gentlemen as Messrs. Hellins, Buckler, Bond, Gregson, Harwood, Barrett, Green, Crewe, and others of equal observation and practical knowledge. They must have met with many very interesting cases of melanism and variation in their entomological experience, the publishing of which might open our eyes to new facts, and probably give a clue to some other theory than any yet propounded.

13, Holgate Road, York, April 14, 1877.

CAUSES OF MELANISM IN LEPIDOPTERA.

By E. K. ROBINSON.

THE most important of these seems to be the condition and nature of the food-plant; for I have noticed that when the larva has been reared upon succulent and overgrown herbage, the imago generally assumes a larger size and paler shade of colour. This appears distinctly in specimens of the common silkworm-moth (*Bombyx mori*), whose larvæ have for two generations fed upon the juicy lettuce, when placed side by side with others from the mulberry. The silk also produced by the former is inferior and of a pale green tint. Again, most of the marsh moths, and those whose larvæ feed on reeds and other plants growing in water, show a large preponderance of white in their colouring. Take for instance the whole genera *Nonagria* and *Leucania*. Again, gloomy woods where the air is damp, and the plants bleached and straggling, are the haunts of pale dull moths, such as the genera *Acidalia*, *Cabera*, and others. The different varieties of *Lomaspilis marginata* seem a good instance of the effect of locality; I have three dark distinctly-marked specimens, all caught upon a somewhat bare hill-side; and several others with scarcely any

black margin at all—and these were taken in a damp and gloomy copse. On the other hand, plants which are stunted in their growth—as in the neighbourhood of manufactories, ill-watered districts and hill-tops—seem to produce dark varieties, as was partly noticed in the ‘Entomologist’ for April (Entom. x. 93). Food in a semi-withered or dry condition produces dark moths of small size; for *Amphydasis betularia* thus fed becomes in a few generations completely black; and by the same means the proportion of black to white in *Abraxas grossulariata*, and of brown and black to white and red in *Chelonia caja*, is largely increased. Chalk districts seem, as a rule, to be inhabited by insects of a bright, light colour, such as *Lycæna Corydon*, *L. Adonis*, and numbers of *Geometræ*, in which a clear chalky white takes a prominent place. Excessive cold is productive of a bleached appearance in all branches of the animal world. Lastly, plants possessed of resinous or other strong vegetable properties may be said in general to produce dark brown moths—*Boarmia abietaria*, &c., *Thera variata*, *T. juniperata*, *T. simulata*, are a few instances out of many. These facts seem to point to four conclusions:—(1) A large percentage of water in the tissues of the food-plant tends to produce a large pale variety; while small, dark specimens result from dry and stunted food. (2) Resinous and other strong vegetable properties produce distinct brown markings. (3) Chalk soils produce a chalky white or bright colour in insects: conversely we would expect rich loamy soils to be haunted by deeply-coloured moths. (4) A cold climate, or the gloom of damp dark woods, causes a bleached appearance and general absence of distinct markings. Hence a bright and hot sun-light may be supposed to produce bright distinct colours. Experiments in rearing insects by various collectors during the coming season might—by the uniformity of their results or otherwise—fairly settle this much-vexed question of melanism, which is so obviously connected with development of species as to become highly important.

St. Leonard's, April, 1877.

RECREATIONS OF A COUNTRY DOCTOR.

By H. W. LIVETT.

CONCERNING SUGAR; WITH A FEW WORDS ON IVY.

ALL men (save those who expect nothing) have their disappointments, and entomological collectors are not excepted. My experience of sugar last season was a falling off from the previous year's results; and I hear from numerous quarters that others have been equally, if not more unfortunate. The laws governing scarce and plentiful years as regards insects appear to be, as yet, in a great degree beyond our ken. Is it probable that the long-continued rains of winter and spring destroyed many in the pupa state? or do the recent enactments relating to the destruction of birds cause empty spaces in our cabinets, as well as on our fruit shelves? Whatever the reason, my list of captures at sugar—applied, as usual, to my espalier trees—is a short one. *Noctua xanthographa*, *Triphæna pronuba*, and *Xylophasia polyodon* (*mirabile dictu!*), wonderfully few; *Catocala nupta*, plentiful—I took about eighteen or twenty; *Noctua rubi*, a fair number; *Agrotis saucia*, about a dozen; and its cousin, *A. suffusa*, plentiful; *A. segetum*, a pest from its numbers; *Noctua C-nigrum*, plentiful; a few *Scopelosoma satellitia*, *Acronycta tridens*, *A. rumicis*; two *Cosmia diffinis*; *Miselia oxyacanthæ*, plentiful: one *Xylina semi-brunnea*: and several *X. rhizolitha*,—with my old friends, *Anchocelis pistacina* and *Polia flavocincta*, nearly make the list. The latter two were quite as numerous as in 1875, though they appeared much later. On the 15th September I saw the first specimen; during the following fortnight I took upwards of a hundred *P. flavocincta*, while *A. pistacina*—which I did not take—were, as the auctioneers say, “too numerous to particularise.”

I am surprised to find *P. flavocincta* to be, to a certain extent, local. I had numerous applications for it last year from all parts of England. One correspondent in Hertfordshire said he had collected thirty or forty years, and had never met with the species; and another in Yorkshire told me, that although he had often seen *P. chi* by the dozen sitting on walls, he seldom met with one *P. flavocincta*.

A few words as to ivy bloom. In my former paper I said that I had never been successful at ivy; but a passage in Mr. Greene's delightful little book, the 'Insect Hunter's Companion,' describing its great productiveness, induced me to give it another trial,—the rather, as the bloom was particularly fine last year. As the blossoms are, in my neighbourhood, chiefly on high walls—otherwise out of reach—I provided myself with an alpenstock, wherewith to shake the bushes, and one of Mr. Bignell's trays, in which to receive the *Xylina petrificata* and *Dasycampa rubiginea* as they came "dropping in."

I had the experience of some five or six visits, on as many evenings. The results were—two *Xylina semibrunnea*, some five-and-twenty *Cerastis spadicea*, half a dozen *C. vaccinii*, some worn *Orthosia macilentia* and *O. lota*, two or three *Geometra* larvæ, and no end of wood-lice—"grandfathers," as they call them here—fell into my toils. I hope I shall see in the 'Entomologist' that some brother or sister collectors were more successful than I.

Wells, Somersetshire.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

RE-DISCOVERY OF MYCHOIS CERATIONIÆ.—I am glad to inform your readers that *Mychois cerationiæ* has been again taken in this country. Mr. Stainton, in his 'Manual,' records the capture of but one specimen. For the last three years, however, specimens have been taken by myself and by one or two friends in a warehouse in London. I hear, through the kindness of Mr. C. G. Barrett, that Professor Zeller states he has bred it from pods of the locust bean (*Ceratonia siliqua*); but I have reason to believe that the specimens I have taken were fed upon almonds imported from Tarragona and the Island of Iviza.—A. B. FARN; The Dartons, Dartford, April 5, 1877.

SUPPOSED DISCOVERY OF A NEW BRITISH NEPTICULA.—I have this day bred from agrimony (*Agrimonia eupatoria*), collected at Witherslack last October, a *Nepticula* so abundantly distinct from any British species I have hitherto seen, that I fancy it will prove to be *Nepticula æneofasciella* of

Herrich-Schäffer, and an addition to the British fauna. The name seems applicable, for the ground colour is bright dark purple, and the double fasciæ, as I may call them, are of a bronzy golden hue. When this gem was walking about it reminded me of a very minute *Micropteryx albionella*, with the markings of *M. mansuetella*. I have been careful to keep the mines of this novelty separate for reference.—J. B. HODGKINSON; Preston, April 15, 1877.

SPHINX PINASTRI.—This afternoon a pupil of mine—T. N. Waller, son of Rev. T. H. Waller, of Waldringfield Rectory, near Woodbridge, Suffolk—brought me a moth to look at, which he told me had been taken by the gardener on a tree in his father's garden last Midsummer. I immediately recognised it as a fair, though not first-rate, specimen of *Sphinx pinastri*.—(Rev.) A. H. WRATISLAW; School Hall, Bury St. Edmund's, April 17, 1877.

COLIAS EDUSA var. HELICE.—I may mention that during a short stay in the Isle of Wight, in August last, I secured—among numbers of typical *Colias Edusa* and *C. Hyale*—two very fine specimens of the var. *Helice* of the former. They were both taken in a clover field, near Ventnor. I believe Mr. Rogers, of Freshwater, to be mistaken in saying *Helice* was common there last autumn (Entom. ix. 231). He told me that he considered the white var. of *C. Hyale* identical with *Helice*. This probably explains their abundance.—BERNARD COOPER; Fern Lodge, Higham Hill, Walthamstow, January 17, 1877.

LYCÆNA ARION.—The notes which you have published on *Lycæna Arion* in the 'Entomologist' make me think that perhaps it may interest your readers to have an account of the insect by one who has observed it in another of its haunts, the Cotswolds, especially as my experience is rather different from that of Mr. Mathew. The first time I saw *L. Arion* was on June 20th, 1870. There were numbers flying about, many in good condition, but some already worn; and I have no doubt the insect might have been taken a week or ten days earlier, that is about June 10th, while the date on which Mr. Mathew took the insect that same year was July 7th. I have since observed *L. Arion* in the same place on June 15th, 1871; June 21st, 1873; and June 18th, 1874. You will see, therefore, that I put the right time to look for the insect

three weeks earlier than Mr. Mathew,—which is strange, as one would expect Devonshire to be an earlier locality than Gloucestershire. On the other hand, Mr. Mathew has not found them in very good condition. Though I have observed *L. Arion* several years, I have never seen it nearly so common as in 1870: then, it was to be found everywhere in the open spaces among the beech woods; since, I have only seen it in a few favourite corners. What I have heard from other collectors bears out the conclusion that the species is rapidly becoming more scarce. The locality being within easy reach of both Cheltenham and Gloucester, the insect has been well “worked” by the collectors of both places. I differ from Mr. Mathew in thinking it an easy insect to take, and consider Dr. Bree right in describing the usual flight as not unlike that of *Chortobius pamphilus*; but I have also seen it careering wildly about the hollies and low bushes like *Lycena Argiolus*. It is easy to recognise the flight of the female when laying eggs, as she travels in a business-like way from plant to plant, hardly ever rising more than a foot or two above the ground and settling every few yards, till she finds a sprig of thyme to her taste: then the wings are closed over the back, the insect turns round and round, like a dog preparing to lie down, and finally bends down her body and deposits an egg between the leaflets near the end of the sprig, and is off in search of another likely plant. While this process is going on the collector can come within a few feet without disturbing her, can gather the chosen sprig as she leaves it, and follow the same insect from plant to plant. I have taken eggs in this way three years; but the friends to whom I have sent them have failed to keep the young larvæ alive for more than a few days. Still I hope that this plan will be tried again with better success; and that we may have an English description of the larva before it finally disappears from the land and is no more seen.—W. C. MARSHALL; 122, Mount Street, W., March 2, 1877.

BOLETOBIA FULIGINARIA.—I took here, sometime last summer, a specimen of *Boletobia fuliginaria*. As I did not know what it was at the time, I did not make any note of the capture, so cannot tell you the exact date. If my memory serves me it was in June, while after *Procris statices*. At all events I captured it in the same lot of meadows where

P. statice usually occurs; of that I am certain. The specimen, which is a worn male, has been kindly named for me by Mr. W. H. Harwood, of Colchester.—H. JONES; Hawley, Farnborough Station.

DESCRIPTION OF THE LARVA OF *EPHYRA OMICRONARIA*.—The Rev. P. H. Jennings, of Longfield Rectory, Gravesend, very kindly gave me the opportunity of rearing the larva of this species by sending a few eggs on the 10th of June, 1875. They hatched on the 21st of the same month, and the newly emerged larvæ were pinkish brown, with the sides paler. Being supplied with maple and sycamore they fed on both, though probably the former is the only food in a natural state. A larva being well grown by the 5th of July, I took down the following notes on it:—Length about an inch, and of average bulk in proportion; the head has the face flat, but the lobes rounded, and is broader than the 2nd segment. Body cylindrical, and of almost uniform width throughout; the 9th, 10th, and 11th segments very slightly broader than the remainder. Skin smooth, but has a few scattered very short hairs; segmental divisions well defined. Ground colour rather dark, but clear velvety green; head chocolate-brown, with paler markings. Mediodorsal line yellow; it commences on the head, and is conspicuous throughout the entire dorsal area: subdorsal lines waved, also yellow, as are the subdorsal region and the segmental divisions. Spiracles and the usual tubercular dots distinct, black. Ventral surface pale green, with small black tubercles; the segmental divisions black. The pupa is shaped like the others in the genus; it is attached to the leaf at the tail, and by a belt of threads passing over the body in the same manner as in the *Pieridæ* amongst the *Diurni*. It is about half an inch in length, stout and broad at the head, but gradually and evenly attenuated towards the anal extremity. Eye- and wing-cases prominent. Colour dull green tinged with yellow, and there are three yellowish lines throughout the entire length of the dorsal area; the rest of the dorsal surface is marbled with brown, and the wing-cases have a deep smoke-coloured edging. The winter was passed in this stage.—Geo. T. PORRITT; Highroyd House, Huddersfield, April 7th, 1877.

THE METAMORPHOSIS OF *STAUROPUS FAGI*.—In the March

number of the 'Entomologist's Monthly Magazine' there is an account of the metamorphosis of *Stauropus fagi*, by Mr. Birchall. He had two opportunities of watching the moulting of the larva, and describes the legs as being drawn out of the old skin after the manner of crustaceans; and not, as I said, doubled up at the sides of the body, from which position they could not be extricated until the skin had been pushed back a considerable way. What Mr. Birchall says about one of his larvæ not renewing a lost joint at subsequent moultings must be conclusive, for if the skin were cast in the way I described the larva would surely have been provided with an entire limb at the next moult. At the same time I acknowledge it is difficult to divest my memory of what I undoubtedly thought I saw, and which must have been an "error of observation." When I sent my paper to the 'Entomologist' (Entom. ix. 269) I was not aware that what I depicted was new to those who had had opportunities of watching *Fagi*, although it was both new and surprising to myself; and on reflection it seemed probable that an insect which was unique in its form should be unique in its habits. It would be interesting to know whether, *theoretically*, it would not be consistent for the legs to be produced from under the skin of the body, and not from within the old pairs, for this reason: when the larva changes to pupa it always rejects such parts as would be superfluous in the making of the future moth, such as the prolegs, the apparatus for biting, &c. (I only speak of such parts as are essential to the existence of the larva, not the accessories,—as hairs, &c.) Now the three pairs of thoracic legs are required for the insect in its perfect state; and if they were packed away under the skin, in the way I described, when this skin is finally cast off by the pupa, the new pairs would be retained within the case, weak and tender, and deferring their development till the other parts were matured against the emergence of the moth. Taking the other view, the legs ought either to be thrown aside altogether when the larva makes its last change, or else they should be drawn out of the old skins, as on previous occasions, and be external to the pupa, requiring thus a casing for themselves, more after the fashion of *Coleoptera*. Although all Lepidopterous larvæ bear but little likeness in form, and none in habit, to the

perfect insect, it is certain that no other form would be so fit an antecedent; and every time the larva changes its skin it gains something in its internal structure that it had not before,—a gradual merging of the worm into the winged insect. This might be seen well by those who care to see *Cossus ligniperda* dissected at different stages of its growth: when full fed, in the autumn, the wings are to be seen more than an inch in length, and wonderfully developed. One would expect to find this if the larvæ were dug up in the spring, as it passes so short a time in the pupa state; whilst in its first year I suppose there would be no trace of wings. True that *Stauropus fagi* started with jointed legs, but we may suppose that they too gain something in resemblance to the legs of the future moth, in common with the other parts which are undergoing a gradual modification, preparing them for their perfect condition. It seems that in losing the legs *Fagi* would lose a feature of resemblance to the perfect insect, which it would seem consistent for it to retain. I repeat this is but theory, and perhaps not worth thinking over; yet in this time of the year, when the parliament of insects is not sitting, one or other of our masters in Entomology might feel inclined to give a little information to those who, like myself, are still groping after truth, and sometimes blundering. I was mistaken in saying that the first pair of legs was simple: on closer examination with a lens I find that they, too, are jointed, though not prolonged. In all three pairs the tibia ends in a socket, into which fits obliquely a small foot, just as a leaf-bud fits into the swollen extremity of the twig. In the short pair there seems to be a further protuberance, like a solitary toe; but I cannot speak positively, as the larva I was examining to-day was dry and shrivelled—one that died as soon as it had drawn together two leaves with a few silken bars. To the naked eye the legs are smooth, but seen under a lens they are covered with small tubercles, from each of which starts a short hair; the roughness is just appreciable to the touch. Two of the legs broke off as I was handling the dried larva, and it was curious to observe how the setting of the legs, quite as much as their length, justifies the English name of lobster moth: the construction of the under part of the thorax, which can only be conveniently seen in a dead specimen, is wonderfully

crab-like. *Fagi* has a way, too, of throwing out its legs when irritated, just in the same way that a crab has of rearing itself up and hitting out with its claws to avoid being handled. Perhaps the coming summer may give me another opportunity of watching the transformation.—H. M. GOLDING BIRD; 45, Elgin Crescent, March 13, 1877.

"ASSEMBLING" IN GEOMETRÆ.—Mr. Cooper's interesting note, in the March number of the 'Entomologist' (Entom. x. 74), recalls to my mind two instances of a similar phenomenon which came under my own observation. At dusk on the 4th of July, 1874, my brother and I were engaged in "mothing" in one of the enclosures near Lyndhurst, when we noticed a number of *Hemithea thymiaria* hovering over a small black-thorn bush in a very peculiar manner. Investigation proved them to be all males; and a little further search, by aid of the lantern, revealed the cause of their proceedings in the shape of a fine female moth seated on a twig, and unmistakably "calling" the eager green suitors to her bower. The other case in point presented itself on the 23rd of May in the following year, the spot being the hedge-row surrounding "Three-acre Field," on the outskirts of Woodford Forest. A dozen or more male *Rumia cratægata* were fluttering over and around a bush, in which, after a considerable search, we found the female: she was not quite so bold in coquetry as the *Hemithea*, but had ensconced herself somewhat in the interior of the thicket. The only record of the observation of this habit among the *Geometræ* that I remember is that by Mr. C. G. Barrett (E. M. M. iv. 160). There the species was the beautiful *Phorodesma bajularia*; and he remarks that the female appeared to have as great a power of "assembling" as some of the *Bombyces*. I cannot help thinking, however, that the power must reside with many species, for in the majority of cases female moths fly little, if at all, before impregnation; and therefore it is only reasonable to suppose that they possess some subtle means of enticing their vagrant consorts. I have often taken specimens of various species off tree trunks, &c., in perfect condition, and with the *meconium* unexpelled, but which have still laid batches of fertile eggs. The males of *Boarmia roboraria* are generally worn to tatters, whilst the females, although capable of all maternal duties, may be found at rest, still retaining every

charm of primitive freshness. The power of attraction, which obviates the necessity of such female moths leaving their places of concealment before the important business of oviposition is to commence, must operate equally on all the males in the neighbourhood; and consequently we may conclude that the phenomenon termed "assembling" obtains in a large number of species to a greater or less degree. I shall be glad if Mr. Cooper's and the present note induce correspondents to send you accounts of any observations on the points referred to.—B. G. COLE; The Common, Stoke Newington, N., March 3, 1877.

ENTOMOLOGY IN CORNWALL.—In reply to Mr. Hodge's notice (Entom. ix. 274) of captures at St. Austell, I am afraid that many entomologists of that county are not aware that there is such a publication as the 'Entomologist,' *ergo* we have no record of their captures: for by an extract from an Address delivered at the Royal Institution of Cornwall, held in November last at Truro, it was stated that *Deiopeia pulchella* was "hitherto unrecognized in the county," and that the lecturer "anticipated some little difficulty in convincing every one that it was a genuine English moth." I wrote a reply (through the press), and pointed out to the lecturer that twelve captures in Cornwall were recorded during the years 1871 to 1875, and in reply (by letter) from him he states that he wrote to a gentleman at Bodmin, and another at Falmouth, both considered good authorities, neither of whom had seen, and I presume never heard of, any captures of this moth, which is the reason of its being supposed "hitherto unrecognized in the county."—G. C. BIGNELL; 9, Clarence Place, Stonehouse, Plymouth.

ACRONYCTA ALNI LARVA.—I have to record the capture last summer of one larva of this species feeding on hazel (*Corylus avellana*), which in time went to pupa. I hope to rear the imago in its season. This is, so far as I know, the third instance of its occurrence in this neighbourhood.—(Rev.) THOMAS E. CRALLAN, Hayward's Heath, Sussex, March 5, 1877.

GONOPTERA LIBATRIX IN ABERDEENSHIRE.—As I believe that *Gonoptera libatrix* is not common in the north of Scotland, I send this notice of its occurrence in Aberdeenshire. In the month of August I found ten of the larvæ of

this insect on a species of *Salix*; they were then nearly full fed, and all became pupæ in less than a fortnight—the last change occurring on the 13th August. I subsequently found two pupæ spun up among the leaves of the food-plant; they remained about three weeks in pupa, and, with one exception, emerged as perfect insects. I observed that the larvæ fed upon the light-green close-clinging leaves (near the top of the twig), which at a little distance they much resemble. Among other larvæ found on the same plants were those of *Dicranura vinula*; in changing to pupa those taken by me went under the earth in the breeding cage, making their cocoons of grains of soil.—L. DUNBAR; Wick, Caithness.

IDENTITY OF *HELIOTHIS SCUTOSA*, &c.—In the 'Entomologist' (Entom. x. 34) the Editor asks whether anyone has confirmed the identity of *Heliothis scutosa*, and other rare species, reported by Mr. W. H. Thornthwaite as captured near Norwich. To this question the latter gentleman asks me to reply. A few months ago Mr. Thornthwaite's announcement of the capture of these rarities came under my notice, and as my name was mentioned in the communication I, after some hesitation, wrote to him for further information, conveying, I fear, rather unpleasantly, my extreme scepticism about their identity. However, after his very courteous explanation of his mode of working, and the particulars of their capture, I was satisfied of the *bonâ fides* of the captures, made, as they were, in his absence, by friends totally unaware of their value, but working under his directions, and sending him up the specimens fresh and unset. The identity of the species in the case of *Heliothis scutosa* was settled by Mr. Thornthwaite's kindly sending me a specimen which had been taken in the same place last summer. It is abundantly distinct from our other species of *Heliothis*, being whitish, with the bands and large distinct stigmata dark gray. The gray fascia, *before* the dark marginal band of the hind wings, is also very distinct. After seeing it one feels astonished that any variety of *H. dipsacea* could ever be mistaken for it. I have not seen Mr. Thornthwaite's *Noctua flammatra*, but hear from him that it has a *black collar*, which seems conclusive. There is no doubt of the identity of his *Heliothis armigera*, which I *have* seen.—CHAS. G. BARRETT; Pembroke, February 2, 1877.

PLODIA INTERPUNCTELLA: A NEW LOCALITY. — When

taking *Sciaphila Penziana* on the rocks at Witherslack, on the 7th July last, I saw a moth flying high over head, whose peculiar flight attracted my attention; I watched it for some time before it descended within reach of my net. Judge of my surprise when I looked at it. I first thought here is a new "knot horn," never once expecting to find an insect usually found in towns in such a place as Witherslack. I have always associated this species with warehouses and amongst dried fruit, &c. The specimen is a very large and finely-coloured example. Immediately after taking this species, I beat out of an old holly tree (*Ilex aquifolium*) one *Ephestia semirufella*, four *Acidalia inornata*, six *Eupithecia constrictata*, four *E. pumilata*, and sundry other species. The old tree seemed to have been a comfortable shelter for hordes of insects.—J. B. HODGKINSON; 15, Spring Bank, Preston, April, 1877.

GELECHIA ALBIPALPELLA—I succeeded last year in rearing a few specimens of this local species from the larvæ, which make conspicuous blotches on the young shoots of *Genistæ anglica* in the early part of June. About the middle of the month they become full grown, when they descend to the surface of the earth to undergo their changes. The imago appears in August, and is generally distributed over the forest at Loughton, but nowhere common. It is an exceedingly lively species, runs with remarkable celerity, and is boxed with difficulty.—WM. MACHIN, 22, Argyle Road, Carlton Square, E.

BRUCHUS RUFIMANUS.—In the first week of January of this year Mr. Challice, of the South Devon Nursery here, had occasion to open a bag containing a quantity of Seville long-pod beans, when he found that every one had little holes in them,—some one, some two, and some three. On examining the cause he saw several little beetles walking out of these holes. He gave me a quantity of these interesting, but injurious, little weevils.—J. PURDUE; Ridgeway, Plympton, Devon.

[The presence of *Bruchi* in the seeds of a large section of the *Leguminosæ* is but too well known. Contributions towards the life-histories of these and other destructive weevils will, as space permits, appear in these pages.—EN.]

EMMELESIA BLANDIATA.—In your summary of *Lepidoptera* (Entom. x. 8) you give *Emmelesia blandiata* as having

been taken in Glamorganshire, on my authority; but the locality given by me was Dolgelly, which is in Merionethshire. Perhaps you will kindly correct this.—H. JENNER FUST, jun.; Hill Cottage, Falfield, Gloucestershire, February 13, 1877.

HYBERNATION OF WASPS.—During the early part of December I discovered a remarkable instance of apparently gregarious hybernation of wasps in the upper room of a large building used for storing furniture. The furniture was covered with blankets to protect it from rain-water, which had found its way through the roof. On these blankets I found a number of wasps crawling in a half dormant condition. This set my curiosity on edge, and on searching the room further I found large numbers attached to some rough wood near the window. These wasps were so securely attached that at first sight they appeared to have their mandibles thrust right into the wood. I am indebted to Mr. Frederick Smith for naming some examples sent for identification. They are all females of *Vespa germanica*. Amongst the wasps were several *Vanessa Urticæ*.—G. B. CORBIN.

FOUNDATION OF A LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.—The want of some organization for comparison of notes and the interchange of opinions amongst entomologists in the Liverpool district has long been felt. To supply this desideratum Messrs. Nicholas Cooke, Greening, Capper, Leather, and other well-known naturalists in that neighbourhood, had, a little time ago, a preliminary meeting, which resulted in the formation of the "Lancashire and Cheshire Entomological Society." The first meeting was held at the house of Mr. Samuel J. Capper, Huyton Park, when that gentleman was elected President, and Mr. W. H. Mountfield Hon.-Sec. The opening meeting of this promising Society was held on the 26th March in the lecture-room of the Borough Free Museum, Liverpool, which has been lent by the Corporation to the Society, for the purpose of holding its meetings. On this occasion the president read an interesting inaugural address. There is every reason to believe this Society will do good work in its neighbourhood, and give impetus to the study of Entomology. Already the roll of members has attained a considerable length.—ED.

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[No. 169.

MELITÆA ATHALIA *var.* EOS, *Haw.*

By S. STEVENS, F.L.S., &c.



MELITÆA ATHALIA *var.* EOS (= PYRONIA, Hüb., Steph.).

THIS beautiful and probably unique *var.* of *Melitæa Athalia*, which is now in my collection, was captured at Peckham, near London, in June, 1803, by Mr. Howard; and record of it is given in the *old* Entomological Society's Proceedings, now in the library of the present Entomological Society of London, kindly presented to the Society by Mr. Frederick Smith. This specimen is figured in James Francis Stephens' 'Illustrations of British Entomology' (*Haustellata*), vol. i., pl. 4, figs. 1, 2 (1828), and copied into Humphreys and Westwood's 'British Butterflies,' pl. 8, figs. 13, 14; but as these works are now scarce it was thought desirable that a fresh figure should be given of it in the 'Entomologist.' At

the sale of the late Mr. Haworth's collection of insects, in 1834, it was bought by a Dr. Ashburton, whose collection was sold a few years afterwards, and then purchased by myself. The specimen is in beautiful preservation, and almost as fresh as when first captured.

"Loanda," Beulah Hill, Upper Norwood,
May, 1877.

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY.

II.—LOCALITIES OF LEPIDOPTERA.

THE study of geographical distribution has recently become so important that some knowledge of the divisions of the world generally accepted by naturalists is indispensable to every one who wishes to form a clear idea of the relations of the natural productions of any country to those of another. Most naturalists now follow Dr. Sclater in dividing the world into six great regions of distribution; and Wallace, in his recent work on the geographical distribution of animals, has subdivided each of these into four. Although these subdivisions are frequently natural, the limits of others and their true relations to each other are still much disputed. But we will take the main regions separately, in the following order: Palæarctic, Ethiopian, Indian, Australian, Nearctic, and Neotropical, enumerating Wallace's subregions, and adding such remarks as are likely to be most interesting to Lepidopterists. Those who desire further information will find Wallace's work well worth their careful study.

I. PALÆARCTIC REGION.—Under this heading we include the whole of Asia-Europe (except the south-east of Asia); Northern Arabia; and North Africa as far as the Sahara. This region, though poor in species, especially as compared with its extent, is one of the most interesting, partly because its productions are better known than those of other regions, and partly on account of the numerous and important problems connected with their distribution. It is now believed that the bulk of the original fauna of the Old World originated in the north, from whence it was swept south of

the great central ranges by the Glacial period, subsequent to which it has gradually returned, chiefly from Asia. The four subregions admitted by Wallace are :—1. Central and North-European, south to the central ranges, and east to the Caspian, and the valley of the Irtish ; 2. Mediterranean, south to the Sahara, and east to the frontiers of India ; 3. Siberian, including all northern Asia, south to Turkestan, Thibet, the desert of Gobi, and the Amoor ; 4. Mantchurian, including Japan, and the country east of Gobi, and south of the Amoor, as far as the Naulin mountains, south of the Yang-tse-kiang. The latter district is interesting, on account of the mixture of East Indian and North American forms which there mingle with ordinary European species. Many groups extend much farther north in the east of Asia than in the west, owing to the different conformation of the country. The fauna of Central Asia is comparatively little known at present, and many insects far from uncommon in their own localities fetch very high prices ; while others, occurring in localities very rarely visited, and almost inaccessible to Europeans, are absolutely unattainable. Besides the large general works on the European Fauna by Esper, Hübner, Ochsenheimer and Treitschke, and Herrich-Schäffer, the principal works on the *Lepidoptera* of the Palæarctic region (not already mentioned, or confined to British species) are those by Wallengren (for Sweden), Rambur (for Andalusia), Snellen (for Holland), Dubois (for Belgium), Eversmann (for South Russia), Lucas and Oberthur (for Algeria), Erschoff (for Turkestan), and Ménétériés and Bremer (for the Amoor). Local lists of the *Lepidoptera* of almost every country, and many small districts in Europe have been published either separately or in magazines.

II. ETHIOPIAN REGION.—This includes Africa, south of the Sahara, and the southern portion of Arabia. Wallace divides it into subregions as follows :—1. East African, and Central ; 2. West African ; 3. South African ; 4. Malagasy. The first is by far the largest, the second taking from it only a broad strip of the west coast, between the rivers Gambia and Congo. The South African region extends on the west coast north to Welwitsch Bay, and on the east to Mozambique. The fourth includes Madagascar and the adjacent islands, which have a peculiar fauna of their own.

The fauna of Africa has an isolated character, being cut off by deserts from the northern continents; and though now richer than any other part of the world in large mammals, its *Lepidopterous* fauna is less rich than might be expected, though chiefly consisting of peculiar forms. It has considerably more affinity with that of India than with that of Europe. The Madagascar Fauna is specially interesting, but rather from the peculiar manner in which certain forms common to Madagascar and the main land have diverged from each other in different ways than from the number and beauty of the species not found on the continent. Several species, once believed to be confined to Madagascar, are now known to occur in East Africa; and it is probable that others will be discovered when that country is better known. The more abundant and widely distributed species of African *Lepidoptera* have lately become comparatively common in collections, owing to the large numbers sent home by different professional collectors; but insects from any little visited part of Africa, or species remarkable for their size and beauty, which rarely come in numbers, still command high prices at all times. The only systematic works specially on the *Lepidoptera* of the African region are those by Trimen on the butterflies of South Africa (now out of print); the papers by Wallengren on the *Lepidoptera* of Caffraria, in the Swedish Transactions; and Boisduval's 'Lépidoptères de Madagascar.' *Lepidoptera* are, however, treated of in various scientific voyages, such as Peter's 'Reise nach Mossambique' and Van der Decken's 'Reisen in Ost-Afrika.'

III. INDIAN REGION.—India, South China, and South-Eastern Asia generally; the Philippines, Formosa, and the three great islands of Java, Sumatra, and Borneo. This district is very rich in *Lepidoptera*, and its productions are comparatively well known; but there are no special works devoted to them which need be mentioned here, as any of importance are limited to isolated groups. Notwithstanding the number of Europeans in this region, good collections are less frequently received from it than might be supposed; common Indian butterflies are always to be had, but frequently in poor condition; and collections from the interior Himalayas, or from any infrequently visited portion

of this region, are always interesting and valuable. A great number of peculiar forms are confined to the Indian region, while others show more or less affinity with Europe, Africa, or Australia. It is to be noted that Indian specimens of insects common to India and Europe, or North Asia, are generally considerably smaller in India, owing, perhaps, to the more rapid development of the larvæ in a hot climate. Wallace subdivides this region into subregions as follows:—1. Hindostan, or Indian subregion; 2. Ceylon and South Indian; 3. Himalayan, or Indo-Chinese; 4. Indo-Malayan, including the Malayan Peninsula; Borneo, Java, and Sumatra. The divisions explain themselves; and as their correctness is much disputed, we will not further notice them.

IV. AUSTRALIAN REGION.—Includes Celebes, New Guinea, Australia, and New Zealand, the Polynesian Archipelago, and all the islands between or near those already mentioned. The affinities of this region are chiefly with the last, though many of the characteristic Indian forms are wanting. On the whole, the fauna is poor, though some groups (for example, *Papilio*) attain their maximum of size and beauty here. Australia itself is more remarkable for peculiar forms of *Lepidoptera-Heterocera* than for its butterflies. Wallace divides the Australian region into four subregions as follows:—1. Austro-Malayan Subregion (*Papua, Moluccas, &c.*); 2. Australian; 3. Polynesian; 4. New Zealand. Butler's 'Catalogue of Lepidoptera of New Zealand,' forming part of the 'Zoology of the Voyage of the Erebus and Terror,' is the only general work on the *Lepidoptera* of any part of the Australian region. Except from South Australia, specimens are only obtainable casually from this part of the world, when the islands of which it consists happen to have been recently visited by collectors.

V. NEOTROPICAL REGION.—Comprises South and Central America, the West Indies, and a great part of Mexico. This region is probably by far the richest in *Lepidoptera* of any in the world; it produces more than half the known butterflies, and whole families are almost if not entirely confined to it. It is said that over 2000 species of butterflies are met with in the valley of the Amazon alone. Wallace divides it into subregions as follows:—1. Tropical South American or Brazilian Subregion; 2. South Temperate,

or Chilian; 3. Tropical North American, or Mexican; 4. Antillean. The Chilian Lepidopterous fauna is very peculiar, so closely resembling that of California, and even of Europe, that Chili and California might almost be regarded as outlying portions of the Palæarctic region. Whether the Pampas of South America are properly classed with Chili, I much doubt; but we require more extended observations to confirm or modify Wallace's subregions. Many insects are common throughout Tropical America, and are always easily to be obtained; others are more local, and are not always to be procured. Insects from Chili, Buenos Ayres, and even the West Indies are frequently more difficult to obtain than those of other parts, probably because their more limited faunæ offer less attractions to naturalists. Only five of the West Indian Islands—Cuba, Haiti, Porto Rico, Jamaica, and Trinidad—have been at all properly worked; and insects from the two former are very scarce in collections. The fauna of Trinidad scarcely differs from that of the opposite coast of South America. There are no systematic works on the *Lepidoptera* of this region, apart from detached papers, if we except the Lepidopterous portion of large books on Cuba and Chili; but a great number are figured in the large illustrated works devoted to *Lepidoptera* generally, such as Cramer's 'Papillons Exotiques,' Hewitson's 'Exotic Butterflies,' Hübner's 'Sammlung Exotischer Schmetterlinge' and 'Zuträge'; Herrich-Schäffer's 'Aussereuropäische Schmetterlinge'; Felder's 'Reise der Fregatte Novara,' &c.

VI. NEARCTIC REGION, OR NORTH AMERICA.—This region is much poorer in *Lepidoptera* than the last, and is so closely related to the Palæarctic region that but for conclusions drawn from other natural groups it could scarcely be separated from it. Wallace divides it into four subregions, as follows:—1. Western, or Californian Subregion; 2. Central, or Rocky Mountain Subregion; 3. Eastern, or Alleghany Subregion; 4. Subarctic, or Canadian. All these districts are now being well worked, either by resident Lepidopterists or by scientific surveys. Their productions are usually not difficult to obtain; those from the south-western and southern states being generally the most prized and the rarest. The principal works on this region are Abbot and Smith's 'Lepidoptera of Georgia,' Boisduval and Leconte's 'Lépidoptères de l'Amerique Sep-

tentrionale,' and Edwards' 'Butterflies of North America,'—a fine illustrated book now in progress. A large amount of information relating to North American *Lepidoptera* appears every year in the publications of the numerous entomological and other scientific societies now existing in the United States and Canada.

Zoological Department, Royal Dublin Society,
May, 1877.

MELANISM IN LEPIDOPTERA

BY NICHOLAS COOKE.

BEING a man of peace, it is out of my way even to have a battle of words with Dr. Buchanan White on this subject; and I was much pleased on reading his able communication in this month's 'Entomologist,' to find that he has rendered it quite unnecessary. I agree with every word he has written except, in spite of his positive assertion, that natural selection is not sexual selection. I believe—and I think every person of common sense believes—sexual selection is a most natural selection. I also think he is wrong in saying that "the occurrence of pale forms on chalk and other light-coloured formations is brought about by natural selection, not by the geological formation." If natural selection exercises such a potent influence over the colours of *Lepidoptera*, we should have no dark species at all on the chalk. Since my paper appeared I have bred two dark varieties of a light-coloured species from the chalk. I regret that I am not at liberty to mention the name of the species; the larvæ were sent to me when young by a kind friend, and I fed them on an oak tree in my garden in a leno sleeve. I never saw or heard of a dark specimen of the species before last year, and it puzzles me to account for them, as other dark specimens have been procured from the same wood on the chalk. Had it not been so, I should have concluded that the soot on my tree was the cause of the aberration; but it is not so, for it is evident there is a dark race of this particular species existing on the chalk a long distance from any manufacturing district.

I have also lately become acquainted with the fact that *Tephrosia biundularia* of the dark form, for which Dr.

White proposes the name of *Delamerensis*, occurs in the "black district" of Staffordshire—in Burnt Wood—not far from which an immense quantity of smoke is produced by the manufacture of iron and pottery.

When I read my paper on "Melanism" before the Lancashire and Cheshire Entomological Society, I was under the impression that both Dr. White and Mr. Birchall wished to teach us that natural selection, or the survival of the fittest, was the *cause* of Melanism. It now appears I was either mistaken or else Dr. White has come round to my views, for, after telling us what natural selection does for *Lepidoptera*, he asks the question, "What is the exciting cause?" This is just the point. I admit that when a variety has been produced—no matter by what means—it becomes hereditary. If circumstances favour the reproduction of the variety, it may be intensified generation after generation; or, if it appears under unfavourable circumstances, it may revert to the type form in a few generations—but this is all that natural selection has to do with Melanism. I suggested two causes which I imagine are at work in producing dark varieties, and quite agree with Mr. Prest that we must look further.

When I mentioned these I was well aware that it was only an attempt on my part to account for the dark varieties in two or three species, and I know to my great pleasure and wonder that there are extraordinary dark varieties produced in Scotland. These cannot have been caused by smoke or chemicals, but they are, as far as my experience goes, produced in black bog or peat soil, which I suppose contains a large amount of carbon; and this may have the same effect on the caterpillars, through the tissues of the food-plants containing more carbon than in other situations, as when the caterpillars eat the carbon in the form of soot along with their food. I was at school at York, and have been there since. That city is, I think, as "the crow flies," not more than thirty-miles from Leeds, the blackest town in Yorkshire. Why, one can hardly distinguish a white sheep from a black one near Leeds, owing to the quantity of soot that falls on the pasture. Smoke from the district around Leeds will be carried by the wind at least sixty miles; and if Mr. Prest will put on a pair of white trowsers and walk through a

field of hay-grass outside the walls of York, after a few days of dry weather and westerly winds, he will find his legs in such a state that he will be glad to get into a cab and drive home rather than walk through the streets: so that although the country immediately around the city is purely agricultural, yet I am satisfied there is a sufficient amount of soot deposited on the plants to affect the colours of the *Lepidoptera*. I am the more inclined to think this is one great cause of dark varieties because a gentleman of high standing in this district, who either is or was a calico-printer, has said that he could produce varieties of moths by giving the larvæ chemicals along with their food. If he sees this and would give us his experience, it might do more towards arriving at some knowledge of the cause of Melanism than any amount of papers written on the subject by those who have not made any such experiments.

I was much pleased with the observations of Mr. E. K. Robinson, and think it is highly probable that other varieties are caused by various kinds of food.

With regard to anal appendages, the printers made me say what I never intended—that the sexual organs of *Cerastis vaccinii* differ little from those of *C. spadicea*. I said there was no difference. No one present at the meeting could perceive any difference either between *C. vaccinii* and *C. spadicea*, or between *Acronycta psi* and *A. tridens*. The two latter species have such very different larvæ that they must be considered distinct, for we cannot have a better specific character; but until I know that the larva of *C. vaccinii* differs from that of *C. spadicea*, I shall certainly consider them mere varieties of one species. I shall be much interested in Dr. White's investigations which are to appear in the Linnean Transactions.

Gorsey Hey, Liscard, May 8, 1877.

ANDRENA FEROX.—In the March number of the 'Entomologist' (Entom. x. 62) Mr. F. Smith refers to *Andrena ferox* as having been taken by me at Guestling. Will you allow me to state that this specimen, which I had the pleasure of submitting to him for identification, was taken not by myself, but by the Rev. E. N. Bloomfield.—E. A. BUTLER; University School, Hastings, March 1, 1877.

ON THE SPIDERS OF SCOTLAND; WITH A LIST OF SPECIES.

By the Rev. O. PICKARD-CAMBRIDGE, M.A., C.M.Z.S.

PREVIOUS to the year 1858 no collector appears to have paid any attention to the *Araneidea* of Scotland. In that year Mr. James Hardy (then of Penmanshiel, now of Old Cambus, by Cockburnspath, Berwickshire) published the results of occasional attention paid to this order, while collecting other objects of Natural History. The spiders collected then by Mr. Hardy were all determined, and one species which appeared to be new to science (*Walckenaëra Hardii*) was described, by Mr. John Blackwall (Ann. and Mag. N. H., 2nd ser., vi., p. 340); while, in the 'Proceedings of the Berwickshire Natural History Field Club,' vol. iv., pp. 92—96, 1858, Mr. Hardy, under the title of "List of Berwickshire Spiders," gave a complete list of all his captures up to that time, amounting to seventy species, distributed among twenty-two genera. Three years after this,* a few weeks tour in Scotland (in June and July, 1861) enabled me, in spite of a great deal of wretched weather, to collect examples of eighty-three species, belonging to twenty-one genera. Thirty-seven of these species were additions to those enumerated in Mr. Hardy's list, thus bringing up the number of Scotch spiders to one hundred and seven. Five years after this (in 1866) I received several small collections of spiders from Mr. Morris Young, of Paisley, by whom they were found in that neighbourhood: of these only those either new to science, or else previously unknown as British, have, up to this time, been recorded. From 1866 to 1871 no one seems to have paid any further attention to spiders in Scotland; but from the latter date up to the end of 1874 repeated and extensive collections were most kindly forwarded to me from Berwickshire and the Border-land by Mr. Hardy. The results of my examination of these collections were published in the 'Proceedings of the Berwickshire Natural History Field Club,' vol. vii., pp. 307—323, 1875; the greater part of the new species added to the British list having been previously

* See "Sketch of an Arachnological Tour in Scotland in 1861; with a List of Scotch Spiders." By the Rev. O. P. Cambridge. 'Zoologist,' 1862, pp. 8041—8051.

described and figured in the 'Linnean Transactions' (xxviii.). About the same time several collections were sent to me from the neighbourhood of Aberdeen and other parts of Scotland, by Mr. J. W. H. Traill, of the University, Aberdeen. The new species contained in these collections were also described and published by myself in the 'Linnean Transactions' (xxviii.), and a general list was published by Mr. Traill in the 'Scottish Naturalist,' vol. ii., pp. 24, 25, and 300. This list contained one hundred and thirty-three species belonging to twenty-three genera. More lately still I have received some small collections made in the neighbourhood of Castle Douglas, N.B., from Mr. W. D. R. Douglas, of Orchardton; and in the vicinity of Glasgow, from Mr. H. C. Young, of Port Dundas, in that city.

The time appears now to have arrived for summarising the results of all the lists and collections referred to; and this task I have attempted in the present list. After the name of each species the localities in which it has been found are given, and after each locality the initials of the collector are added within parentheses. The names to which these initials refer will be found in a note; and in another note is a reference to those papers and publications in which the various spiders now tabulated, or any of them, have been noticed.

The nomenclature and classification adopted are mainly those contained in a "Systematic List of British Spiders" (Trans. Linn. Soc. vol. xxx. pp. 319—334). For synonyms of such spiders as were known up to the time of their publication, reference must be made not only to the works of Mr. John Blackwall, and the papers of the present writer in the 'Linnean Transactions,' &c., but also to the important works of Dr. T. Thorell, of Upsala (*vide* note 1, *post.*).

The number of species contained in the subjoined list, as the result of the different collections and lists above mentioned, is two hundred and thirteen, belonging to fifty-three genera, and distributed among nine families. It should be mentioned, however, that the apparently great increase of genera represented in the present list is mainly due to the generic limits adopted by Mr. Blackwall, and by myself in earlier British lists, having been considerably altered.

It cannot be considered that the number of Scottish

spiders here recorded is anything like the number that exists; even that family most numerous represented (*Theridiides*) has, there can be little doubt, many species yet to be discovered, although comprising, as it does already, more than half the known Scottish spiders. Three genera alone of this family monopolise one hundred and two species:—*Neriëne*, thirty-seven; *Walckenäera*, twenty-eight; and *Linyphia*, thirty-seven: and it is to these three genera that we may yet expect the most numerous additions to be made by future collectors, especially as the known *British* species of these three genera amount to two hundred.

It is to be hoped that the present summary of the recorded Scottish spiders may induce some of the numerous entomological collectors to pay more attention to them, and so to furnish ere long materials for a supplement to the list subjoined.

The following analysis furnishes a key to the distribution of the species among the different families and genera recorded:—

Fam. <i>Dysderides</i> .	Gen. <i>Cryphoea</i> , 1.
Gen. <i>Harpactes</i> , 1.	„ <i>Hahnia</i> , 1.
„ <i>Segestria</i> , 1.	Fam. <i>Theridiides</i> .
„ <i>Oonops</i> , 1.	Gen. <i>Pholcomma</i> , 1.
Fam. <i>Drassides</i> .	„ <i>Theridion</i> , 6.
Gen. <i>Gnaphosa</i> , 1.	„ <i>Nesticus</i> , 1.
„ <i>Micaria</i> , 1.	„ <i>Phyllonethis</i> , 1.
„ <i>Phrurolithus</i> , 1.	„ <i>Euryopis</i> , 1.
„ <i>Prothesima</i> , 2.	„ <i>Asagena</i> , 1.
„ <i>Drassus</i> , 5.	Gen. <i>Neriene</i> , 37.
„ <i>Clubiona</i> , 10.	„ <i>Walckenäera</i> , 28.
„ <i>Cheiracanthium</i> , 2.	„ <i>Pachygnatha</i> , 2.
„ <i>Anypheana</i> , 1.	„ <i>Tapinopa</i> , 2.
„ <i>Agröeca</i> , 1.	„ <i>Linyphia</i> , 37.
„ <i>Hecäerge</i> , 1.	„ <i>Ero</i> , 1.
Fam. <i>Dictynides</i> .	Fam. <i>Epeirides</i> .
Gen. <i>Dictyna</i> , 1.	Gen. <i>Meta</i> , 3.
„ <i>Amaurobius</i> , 2.	„ <i>Tetragnatha</i> , 1.
Fam. <i>Agelenides</i> .	„ <i>Cyrtophora</i> , 1.
Gen. <i>Cœlotes</i> , 1.	„ <i>Singa</i> , 3.
„ <i>Tegenaria</i> , 1.	„ <i>Cercidea</i> , 1.
„ <i>Textrix</i> , 1.	„ <i>Zilla</i> , 2.

<i>Gen. Epeira</i> , 7.	<i>Gen. Trochosa</i> , 5.
Fam. <i>Thomisides</i> .	„ <i>Lycosa</i> , 8.
<i>Gen. Xysticus</i> , 10.	„ <i>Tarantula</i> , 2.
„ <i>Philodromus</i> , 3.	Fam. <i>Salticides</i> .
„ <i>Thanatus</i> , 1.	<i>Gen. Epiblemum</i> , 1.
Fam. <i>Lycosides</i> .	„ <i>Heliophanus</i> , 1.
<i>Gen. Ocyale</i> , 1.	„ <i>Euophrys</i> , 3.
„ <i>Dolomedes</i> , 1.	„ <i>Attus</i> , 2.
„ <i>Pirata</i> , 2.	„ <i>Salticus</i> , 1.
9 Families.	53 Genera.
	213 Species.

NOTE 1.—The works referred to above for references as to synonyms, descriptions, figures, and other particulars, are a ‘History of the Spiders of Great Britain and Ireland,’ by John Blackwall, Esq., Lond., 1859—64; with some other papers, subsequently published by the same author, in ‘Annals and Magazine of Natural History, 1864—72. Also papers on British spiders, by the Rev. O. P. Cambridge, in ‘Transactions of the Linnean Society,’ xxvii., pp. 393—463, pls. liv.—lvii.; xxviii., part 3, pp. 433—458, pls. xxxiii.—xxxv.; and part 4, pp. 523—555, pls. xlv., xlv.; ‘Journal of the Linnean Society,’ vol. xi., pp. 530—547, pls. xiv., xv.; ‘Proceedings of the Zoological Society,’ 1873, pp. 747—769, pls. lxv., lxvi; and ‘Synonyms of European Spiders,’ by Dr. T. Thorell, Upsala, 1871—73, pp. 1—644.

NOTE 2.—The names referred to under the various initials appended to the localities mentioned in the list are as follows:—

J. H. = Mr. James Hardy, of Old Cambus, Berwickshire.

O. P. C. Rev. O. P. Cambridge, of Bloxworth, Dorset.

M. Y. Mr. Morris Young, of Paisley.

J. F. M. Rev. James Francis Montgomery, Dean of Edinburgh.

J. W. H. T. Mr. J. W. H. Traill, University, Old Aberdeen.

W. D. R. D. Mr. W. D. Robinson-Douglas, of Orchardton, near Castle Douglas, N.B.

H. C. Y. Mr. H. C. Young, of Port Dundas, Glasgow.

LIST OF SCOTCH SPIDERS.

Fam. DYSDERIDES.

HARPACTES, *Templeton*, = *Dysdera*, *Bl.*, *ad partem*.

Harpactes Hombergii, Scopoli. Berwickshire (J. H.); Muchalls, Dunkeld (J. W. H. T.); Trosachs (O. P. C.); Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).

SEGESTRIA, *Latr.*

Segestria senoculata, Linn. Cheviots (J. H.); generally distributed in Aberdeen district (J. W. H. T.); Trosachs, Pentlands, and Loch Rannoch (O. P. C.); Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).

OONOPS, *Templ.*

Oonops pulcher, Templeton. Berwickshire (J. H.); near Aberdeen, and Dunkeld (J. W. H. T.).

Fam. DRASSIDES.

GNAPHOSA, *Latr.*, = *Drassus*, *Bl.*, *ad partem*.

Gnaphosa Anglica, Cambr. Berwickshire (J. H.).

MICARIA, *C. L. Koch*, = *Drassus*, *Bl.*, *ad partem*.

Micaria pulicaria, Sund. = (*Drassus nitens*, Bl.) Arthur's Seat, Edinburgh (O. P. C.); near Aberdeen and Dunkeld (J. W. H. T.); Berwickshire (J. H.).

PHRUIROLITHUS, *C. L. Koch*, = *Drassus*, *Bl.*, *ad partem*.

Phrurolithus festivus, C. L. Koch, = (*Drassus propinquus*, Bl.) Arthur's Seat (O. P. C.).

PROTHESIMA, *L. Koch*, = *Drassus*, *Bl.*, *ad partem*.

Prothesima Petiverii, Scop. = *Drassus ater*, Bl. Castle Douglas (W. D. R. D.); Berwickshire (J. H.).

P. nigrita, Fabr. = *Drassus pusillus*, Bl. Cheviot Hill (J. H.); Arthur's Seat (O. P. C.).

DRASSUS, Walck. = *Drassus*, *Bl.*, *ad partem*.

Drassus cupreus, Bl. Berwickshire (J. H.).

D. lapidicolens, Walck. Berwickshire (J. H.); Ballater and near Aberdeen (J. W. H. T.); Castle Douglas (W. D. R. D.).

D. troglodytes, C. L. Koch. Berwickshire (J. H.); Paisley (M. Y.); near Aberdeen (J. W. H. T.).

D. sericeus, Bl. Arthur's Seat (O. P. C.).

D. sylvestris, Bl. Berwickshire (J. H.).

CLUBIONA, *Latr.* = *Clubiona*, *Bl.*, *ad partem*, = *C. epimelas*, *Bl.*

Clubiona pallidula, Clerck. = *C. epimelas*, Bl. Castle Douglas (W. D. R. D.); Muchalls (J. W. H. T.); Inversnaid, Loch Lomond (O. P. C.).

C. brevipes, Bl. Pentland Hills (O. P. C.); Berwickshire (J. H.).

C. terrestris, Westr. = *C. amarantha*, Bl. Berwickshire (J. H.); Pentlands (O. P. C.); Aberdeenshire; Keith (J. W. H. T.).

C. reclusa, Cambr. Berwickshire (J. H.); Braemar (J. W. H. T.); near Glasgow (H. C. Y.)

C. grisea, C. L. Koch. = *C. holosericea*, Bl. Berwickshire (J. H.).

C. trivialis, C. L. Koch. Pentlands (O. P. C.); East Ross and Orkneys (J. W. H. T.).

C. pallens, C. L. Koch. = *C. diversa*, Cambr. Cheviots (J. H.); Dunkeld (J. W. H. T.); Paisley (M. Y.).

C. holosericea, Degeer = *C. deinognatha*, Cambr. Near Aberdeen (J. W. H. T.); Paisley (M. Y.).

C. cærulescens, L. Koch. = *C. voluta*, Cambr. Aberdeenshire (J. W. H. T.).

C. comta, C. L. Koch. Inverurie, Aberdeenshire, and Dunkeld (J. W. H. T.); Berwickshire (J. H.); Paisley (M. Y.).

CHEIRACANTHIUM, C. L. Koch. = *Clubiona*, Bl., *ad partem*.

C. nutrix, Westr. Near Aberdeen (J. W. H. T.). The spider recorded as *Clubiona erratica* from Loch Rannoch (O. P. C.) is probably of this species.

C. carnifex, C. L. Koch. Dunkeld (J. W. H. T.).

ANYPHÆNA, Sund. = *Clubiona*, Bl., *ad partem*.

Anyphæna accentuata, Walck. Pease Dean (J. H.); Dunkeld (J. W. H. T.); Berwickshire (J. H.).

AGRŒCA, Westr. = *Agelena*, Bl., *ad partem*.

Agrœca brunnea, Bl. Berwickshire (J. H.).

HECAERGE, Bl.

Hecæerge maculata, Bl. = *H. spinimana*, Bl. Berwickshire (J. H.); Aberdeen (J. W. H. T.).

(To be continued.)

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR's 'Die Mitteleuropäischen Eichengallen.

By EDWARD A. FITCH.

(Continued from p. 124.)



Fig. 66.—NEUROTERUS LANUGINOSUS.

66. *Neuroterus lanuginosus*, Gir.—This beautiful gall is found on the under side of the leaves of *Quercus cerris*, both on stubs and on old trees. This spangle gall is attached to the leaf by means of a short pedicel, and is not visible on the upper side of the leaf: it is spherical, with a diameter of from 4 to 6 millimetres, depressed in its young state; but later on it becomes 3 to 4 millimetres in height, so that the upper and under surfaces become more or less protuberant. The whole surface of the beautiful red gall is thickly covered with long, white, silky hairs, which, particularly in immature galls, are arranged radiately on the upper side of the gall; and those hairs which emanate from the papilla at the top are yellowish brown and very thickly arranged. It is of a very tender, loose texture in the interior, and contains a larva-cell. The gall falls in October, but does not attain maturity till a month afterwards. Dr. Giraud obtained the fly at the end of March.—G. L. MAYR.

The inquilines and parasite, which Dr. Mayr has bred from this Turkey oak and exotic gall, are *Synergus variabilis*, Mayr, *Sapholytus Haimi*, Mayr, and *Callimome abdominalis*,

Bob., all of which appeared in the spring of the second year.
—E. A. FITCH.

67. *Neuroterus ostreus*, Hart.—

This small gall appears in July at the side of the midrib on the under side of the leaves of *Quercus sessiliflora*, *Q. pedunculata*, and *Q. pubescens*. At first it is enclosed in a membranous covering, which later on splits into two similar flap-like parts and dries up, whilst the gall increases in size, and generally reaches an oviform, rarely spherical, shape, with a longitudinal diameter of 3·8 millimetres. It is smooth, hairless, at first green or yellow, but subsequently becomes, especially when exposed to the sun, covered with beautiful little red or violet circular patches or spots, which are either placed in diagonal rows, crowded together, or tolerably evenly scattered; it is moderately hard, and contains a relatively large larva-cell without an inner gall. The galls fall in August and September, and leave the envelopes on the leaves. Dr. Giraud obtained the producers in autumn, after he had collected the fallen galls.
—G. L. MAYR.



Fig. 67.—N. OSTREUS.

The galls of this species have occurred in almost every locality in England and Scotland where looked for. I have found them to vary greatly in size, shape, and colour; but this is partly owing to the influence of parasitism. However, I think it is doubtful whether we have not more than one closely-allied species yet unrecognised. Giraud, who was the first to describe the insect, possessed a dozen specimens, "some obtained towards the middle of October from galls collected in great quantity towards the end of September, and others captured on the 28th of October upon the buds of oak, where they were occupied in laying their eggs." With Miss E. A. Ormerod a specimen emerged on September 7th; and I have bred the gall-makers in December. Mr. Müller, besides breeding specimens in the second week of October, also obtained the *Neuroterus* in May and June from hybernated galls (Ent. Mo. Mag vii. 209). This last fact is opposed to Giraud's autumn egg-laying; but it is possible that Müller's summer-bred specimens appertained to *Synergus*, as Dr. Mayr

speaks of *S. Tscheki* as emerging commonly from this gall in June of the second year; *Synergus tristis*, Mayr, occurring somewhat earlier in the spring. Hartig described (Germ. Zeit. f. Ent. iii. 342) *Aulax syncrepidus* as a dweller in the gall of this species, but said nothing as to the time of its appearance.—E. A. FITCH.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

ARGYNNIS LATHONIA AT BROADSTAIRS.—It may be interesting to your readers to know that on the 29th of August, 1876, at Broadstairs, I captured a specimen of *Argynnis Lathonia*. The specimen was in very fair condition.—A. F. HERNAMAN; St. Edward's, Oxford, May 1, 1877.

PETASIA NUBECULOSA.—I have been fairly fortunate in capturing *Petasia nubeculosa* this season in its old locality, Rannoch. During the time it was out I found about a couple of dozen. Had it not been for the severity of the weather I should have probably got more. The mountains are now covered with snow, which I expect will not melt this year. Other *Lepidoptera* are scarce; there is no sign of *Fidonia carbonaria*, or the usual visitors, as yet.—DUNCAN ROBERTSON; Camghouran, Rannoch, May 17, 1877.

OCCURRENCE OF BREPHOS PARTHENIAS AT LEA BRIDGE.—While walking along the River Lea, near Clapton, on the 15th of April, my attention was drawn to an insect which alighted on the path a few yards in front of me. I at first thought it was a hybernated specimen of *Vanessa urticae*; but on proceeding to the spot to my great surprise I found it to be a large male specimen of *Brephos parthenias*. Having neither net nor boxes at the time, I managed to get the insect into my hat, and succeeded in bringing it home. I have no recollection of this species occurring so near London before, especially in a marshy district. I saw this species unusually common in West Wickham Wood last Easter Monday.—W. J. HARPER; 37, Mansfield Street, Kingsland Road, April 18, 1877.

BREPHOS NOTHA.—In spite of the lateness of the season, in which little has put in an appearance in these parts beyond an odd hybernated *Vanessa polychloros* and *Gonepteryx rhamni*, our pretty spring friend *Brephos notha* has

been fairly true to its appointment. I saw one or two flying at a tantalisingly safe height one chance sunny morning at the end of last month; and my boys caught a couple of very perfect specimens on the 7th of April flying over young birch trees.—[Rev.] J. CAVE-BROWNE; Detling Vicarage, Maidstone, April, 1877.

TINEINA IN HACKNEY MARSHES.—*Coleophora therinella*.—I have great pleasure in recording the occurrence of this scarce species on Hackney marshes. During the winter months I have found among grass at the roots of thistles small cases containing hibernating larvæ of these insects, which are now feeding freely on growing thistles. They have lately considerably lengthened their cases, and appear to be doing well; but experience has proved this species to be very subject to attacks of ichneumons, and few of them reach the imago state. *Elachista poella*, which has been scarce for several years, has this spring appeared in tolerable numbers; and the pupæ may still be collected in the sedge leaves on the marshes, or the moths swept from the plants early in June.—WM. MACHIN; 22, Argyle Road, Carlton Square, E., May 15, 1877.

TINEINA REARED IN 1876.—*Depressaria propinquella* furnishes work for the collector very early in the year, and is to be found everywhere amongst *Epilobium montanum*. About Preston and Witherslack it mines the leaves, and compels any who seek it to get wet feet. A little later, in the same plant and others of the family, *Laverna ochraceella* occurs, but appears to feed first in the stem, and afterwards mines the leaves near the midrib, spinning up in a white cocoon. This is contrary to former observation, and I shall be glad of correction if wrong. There is one old weather-beaten buckthorn tree (*Rhamnus catharticus*) on Whitbarrow which abounds with *L. rhamniella*: every bud has indications of a tenant, and plenty may be bred with ordinary care. The bare exposed rock on which this tree grows leads me to remark what various conditions suit many insects; beneath it, on plants amongst the shingle, *Coleophora albitarsella* feeds, and must have some difficulty in flying at all in some seasons, as nearly every wind would disturb and carry weak-winged insects away with it. *Elachista apicipunctella* is a marvel: it is very difficult to find; for

three years it has been assiduously sought in its locality; and I cannot say much about its habits, having only bred about six. The grass in which it must feed is covered with rotting willow herbs and other plants; it is bad to find so early in the year as April. The larva of *E. cinereopunctella* first delighted me this year; it is beautifully spotted with red; it feeds along with *E. gleichenella* at Grange. No one who collects should fail to breed *E. luticomella* and *E. atricomella*; but they both appear to delight in destroying their brilliancy when they emerge. No caught specimen I ever saw could compare with those bred. *E. humilis*, which I think is not very well known, feeds in a long stiff grass in very wet places in Brockhole's Wood; the larva is very light yellow, feeding downwards during March and April, and emerging in the middle of June—although a continuous succession of broods of larvæ appear to be always mining in the grass. *E. adscitella* and *E. megerlella* must have more attention paid to them, as they appear to mine the same grass and are very much alike, unless there is a larval difference. *E. dispunctella*, like *E. humilis*, has, I believe, never been bred before; and, as only one larva was found, very little can be said about it. This one was taken on June 5th, in what appeared a dry stem of *Festuca ovina*, and was quite full fed; it was of a dirty unicolorous brown; it emerged July 8th. The right time for taking *Cemiostoma Wailesella* is when the flower of *Genista tinctoria* is just appearing, say the 27th of June; its mine strongly reminded me of *Nepticula septembrella*, almost a black blotch.—J. H. THRELFALL; Preston.

THE "HORNS" OF CATERPILLARS.—"What are they for?" This question was asked me one day, and I was obliged to confess frankly, "I do not know." I am alluding especially to the horns that "adorn" the group of *Sphingidæ*, because a function—it may, indeed, be a wrong one—has been assigned to the appendages behind the head of the larvæ of *Papilio Machaon*, and the caudal ones of *Dicranura vinula*. I have searched many books on Entomology, but have never been able to find anything satisfactory on the subject. That they are, however, designed for a definite object cannot be doubted. The first thought that seems to suggest itself is that like the horns of *P. Machaon* and *D. vinula* they are intended as a means of defence for these most helpless

creatures, by giving an aspect of ferocity, which may deter their foes from attacking them; a similar purpose being attributed to the eye-like spots of the larvæ of *Porcellus* and *Elpenor*. Doubtless amongst the contributors to the 'Entomologist' many can afford some useful information. Again, will someone say what are the protuberances of the caterpillars of the *Cuspidatæ*?—J. ANDERSON, jun.; Chichester.

OAK-GALLS: *APHILOTHRIX CORTICIS*, L.—These galls are of some interest from their presence not having been yet recorded in Britain. About the beginning of March I found specimens on an oak in the neighbourhood of Isleworth agreeing so perfectly with the description given by Dr. Mayr in his 'Eichengallen' (p. 7) as to leave no doubt of their identity. The galls were placed in young bark, pressing forward beneath old rind which had apparently been displaced by lightning. They were about a quarter of an inch in length, cup-shaped at the top and obconical,



EO

A. CORTICIS.

but usually a good deal flattened longitudinally, and irregular in form from being much pressed together. The cup-shaped mouth was sharp at the edge, and closed by a convex woody cover, woolly on the surface, with a furrow running round the circumference a little below the edge of the cap, this furrow provided with a row of deep punctures; the whole gall-head bearing much resemblance to the top of a Chinese tea-cup, with its little saucer-lid placed inside it. Besides the specimens of galls at this stage of full development and containing the full-grown larva, there were others showing it in every stage from its first appearance through the bark; whilst from the existence of the semi-globose head (which subsequently decays and withers off, exposing the characteristic cup-shaped and lidded summit of the developed gall) it is scarcely distinguishable from the single-celled form of *Aphilothrix radialis*. These specimens when first coming through the bark were shiny, rounded above, and greenish; but presently the green colour of the part visible changed to brown for about a third down the gall; this brown part gradually dying, altering in the process into various contorted shapes; and at the time when observed, about the 3rd of March, this

cap was in some cases so decayed that it could be detached, leaving the sharp-edged cup with its cover more woolly than is presently to be found (from the persistence of the fragments of the removed fibrous top), embedded in the bark or just projecting. This alteration may be observed taking place gradually in specimens drying in-doors, where the dead top may be seen contracting and freeing itself from the hard undecayed tissue,—from the sharp edge of the cup-shaped top,—of the persistent part of the gall. These changes are shown in the accompanying figures, where the upper one gives the top beginning to shrivel; the lower, the top lifted from the characteristic form of the gall (both magnified). The exit of the perfect insect is effected through a small hole pierced in the woody saucer-like cover of the cell; and judging from the number and appearance of the tenants, the place of the rightful owner is often taken by parasites.—E. A. ORMEROD; Isleworth, Middlesex, March 20, 1877.

[Being supplied with specimens of these galls I can confirm the determination of the species. From them five specimens of the gall-makers emerged from the 8th to the 12th of April; these clearly exhibit the specific value of the gall, which greatly resembles the single-celled variety of *A. radicis*, and badly defined or much scattered galls of *A. Sieboldi* (= *corticalis*). However, the makers of the three species are abundantly distinct. *Radicis* is ferruginous, somewhat like the common *C. Kollari*, but smaller; *Sieboldi* is bright red-brown; whilst *Corticis* is black-brown, almost black: both the latter species are normally larger than *Radicis*. In addition to the five *Aphilothrix* I have bred (14th April to 1st May) twenty-four specimens of *Synergus incrassatus*, H., its inquiline. Dr. Mayr's descriptions of these galls, with two figures, will be found translated in the 'Entomologist' (Entom. vii. 50).—E. A. F.]

PRACTICAL ENTOMOLOGY.—Forty-five years ago, when the history of "blights" was indeed dark—notwithstanding the labours of those giants of Entomology, Kirby and Spence—"Rusticus" wrote:—"I maintain that there can hardly be a greater service performed to horti- and agri-culturists than by pointing out to them the nature and habits of their insect enemies." Since then the honoured names of Curtis, Newman, Westwood and Murray stand forward amongst those who have done or are doing good service to the country, by

directing attention to the histories of, and remedies for, the insect pests which yearly cause it a heavy loss. Still the subject requires to be more worked out by the public at large, for the words of Edward Newman still remain as true as when he wrote them. Agriculturists know only too well the difficulties and losses, but it is only occasionally they have the time and special knowledge requisite to work out the observations how best to meet them; and entomologists, though acquainted with the history of the insects themselves, are often unacquainted practically with the working of the prescribed remedies, which are necessarily not adapted for the exigencies of each special case. To do good both must work together. Unless the cause of disease is known, prevention is impossible and cure impracticable, and, besides the history of the insect, we need returns of the amount of its presence or absence under various circumstances, to know which is the predisposing or counteracting one. "The progress of every science depends upon the discovery of facts, which may be called scientific practice, and upon the conclusions deduced from them—that is, on theory and practice. They may be compared to the army and diplomacy in statecraft. Diplomacy wages no actual warfare, but is not seldom the cause of it: and the soldiers have to make experiment after experiment, to marshal facts against facts, until it appears which side is the stronger." So writes Professor Max von Pettenkofer, in the current number of the 'Contemporary Review'; and with that axiom in view, our aim now is to develop and weld together the soldiers and diplomatists of agricultural entomology. With this view a pamphlet has recently been printed, accompanied by ruled and columned sheets for the purpose of recording monthly observations on certain selected insects, for the most part remarkable for the injury they cause to our common crops. For convenience of observers, the sheets are accompanied by short but popular descriptions and clearly-drawn figures of the insect pests, which it is hoped may save all difficulties in ascertaining what insect is intended, and guard against consequent errors. Thus, it is now hoped to obtain a general series of observations through the country, which, if followed up even partially, cannot fail to be of service. Their object is to arrive at cause and effect as influenced by various conditions of locality, weather, soil, and more

especially cultivation, with a view to the suggestion of remedies, prevention of insect attack, or limitation of injury. The distribution of these papers is somewhat of an experiment, but similar observations taken and recorded by members of the Meteorological Society have not been without benefit; and it is hoped that agriculturists, horticulturists, and field naturalists will each lend their best support, as the object is a worthy one. If reliable information can only be obtained from competent observers (which on the prepared forms would cost them but a few minutes occasional labour), it is intended to digest it into a report primarily for the benefit of the observers, and which could not fail to be of great value to the country at large. Few but those scientifically or practically concerned know the heavy money losses constantly going on from insect causes in the crops; but it is only by co-operation in observation that the root of the evil can be thoroughly reached. Further information may be obtained of the Rev. T. A. PRESTON, Marlborough, Wilts; or of EDWARD A. FITCH, Maldon, Essex.

ANSWERS TO CORRESPONDENTS.

F. BEYNON.—PYRRHOCORIS APTERUS.—Would you kindly tell me in what countries the Hemipterous insect *Pyrrhocoris apterus* is found? I have found it nowhere on the mainland, and only on the island off Teignmouth, which Curtis mentions. I may say on this rock there are no ants of any kind. On another island not far from it ants abound in great numbers, but there is no *Pyrrhocoris apterus*. It is most probable, I should think, that this insect has exterminated the ants. Is it likely that this insect was brought over by a bird?—F. BEYNON; Hardwick, Torquay.

[*Pyrrhocoris apterus* occurs nearly throughout Europe. Being a common garden insect in some parts of France, &c., it might easily be imported by chance, but I do not know that it has been. I should much like to know the grounds for thinking that "it has exterminated the ants;" the ants are more likely to have exterminated it, I think. I should be glad of specimens if it is common.—F. B. W.]

WOODSTOCK.—Can any correspondent of the 'Entomologist' give me information for working *Lepidoptera* round Woodstock?—C. LEMESLE ADAMS; The Estates Office, Blenheim Palace, Oxford.

THE ENTOMOLOGIST.

VOL. X.]

JULY, 1877.

[No. 170.]

BIOGRAPHICAL NOTICES.

No. II.



JAMES SCOTT BOWERBANK, LL.D., F.R.S.

By JOHN T. CARRINGTON.

THE late Dr. Bowerbank, whose portrait (taken by Messrs. Maull & Co.) is given above, although little known to the present generation of scientific students as an entomologist, has every claim to a place in the biographical series now

appearing in this magazine. To him, and some of his contemporaries, we owe much of our present knowledge in various branches of Natural History. The little band of workers to whom he belonged, and who are now fast passing away, were so unostentatious, but so successful, in their studies, that they are deserving of our admiration. The pursuit of knowledge half a century ago was a very different matter from what it is in the present day; the great facilities now offered to students were then unknown.

Born 14th July, 1797, Dr. Bowerbank in due course became a member of an eminent firm of distillers in London, with which his family had long been associated. This occupation he followed for some time successfully; but, having always a strong taste for natural science, he eventually left this, to him, less congenial pursuit, and finally devoted himself entirely to Natural History. Upwards of half a century ago he was an eminent lecturer on biological subjects before the old Mathematical Society of Spitalfields, a Society which has probably produced from amongst its members more eminent scientific men than any association in this kingdom.

As an entomologist he was well known for his careful and accurate studies of insect anatomy. He chose this subject for his first published paper, which appeared in the 'Entomological Magazine,' in 1833, "On the Circulation of the Blood in Insects." To show that his interest in this subject long continued, I may remind my readers that in 1873, forty years later, he published in pamphlet form an elaborate article, 'On the Brain and a Portion of the Nervous System of *Pediculus capitis*,' which contains some interesting observations on the amount of sensation exhibited by several insects when injured or mutilated.

Dr. Bowerbank's great work, and the one by which he will be best known to posterity, is his 'Monograph of the British Spongiadæ.' Of this work three volumes have already been published by the Ray Society in their Transactions; and the manuscript of the fourth was fortunately completed only within a few days of his death. Those who have worked with this splendid manual can well appreciate the amount of labour and careful observation necessary for its production. The British sponges were, until taken in hand by him, an

almost unworked group; but from him they received close attention for upwards of thirty years. As an authority in their identification and history he was almost unrivalled.

Dr. Bowerbank was a founder and original Fellow of the Ray, Zoological, and Royal Microscopical Societies; also a Fellow of the Royal Society, the Linnean, Geological, Paleontographical, Chemical, and several other learned Societies, including the London Clay Club, where he was a bright luminary on the memorable Monday evenings, and from which the Paleontographical Society had its origin. As a microscopist he was eminently successful. The present workers in that science are much indebted to him. Through his influence mainly the use of Canada balsam and other well-known and generally-adopted media for mounting microscopical objects, especially those of insect anatomy, was introduced, even if he did not discover it. Scattered papers upon many biological subjects from his pen may be found in the 'Annals and Magazine of Natural History;' the Proceedings of the several Societies to which he belonged; the 'Philosophical Magazine;' the 'Microscopical Journal;' the 'Zoologist;' the 'Entomologist;' and others. Some of the more important relate to his favourite study of the structural and geological relations of the sponges; to the *Pterodactyles*; and to the structure of shells.

Dr. Bowerbank died at his residence, at St. Leonard's-on-Sea, on the 8th of March, 1877, aged eighty years; and his remains were followed to their last resting-place by a number of his old friends and fellow-labourers in science.

His own published works are a far more permanent monument than anything that others can write respecting him. Yet because the story of his life may induce others to follow in his footsteps, it is to be hoped that before Time, the inexorable, has called away his few remaining personal friends, some of them may record more fully than can be done in these pages the life and works of so worthy a father in science as the late Dr. Bowerbank.

Royal Aquarium, Westminster,
June 20, 1877.

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR'S 'Die Mitteleuropäischen Eichengallen.'

By EDWARD A. FITCH.

(Continued from p. 162.)

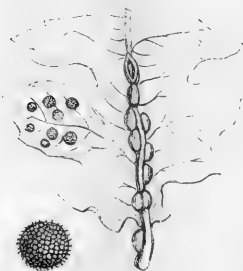


Fig. 69.—*N. MINUTULUS* Fig. 68.—*N. SALIENS*.
(and magnified).

68. *Neuroterus saliens*, Koll. (= *N. saltans*, Gir.).—This gall, which is very nearly related to the former species, may be found in the second half of September on the under side (rarely on the upper side, or on the petiole) of the leaves of *Quercus cerris*: it breaks forth from a longitudinal rent in the midrib. Whilst we generally find but one or two galls of *N. ostreus* on a leaf, those of *N. saliens* are gregarious, and often occur in such a manner that the galls, placed behind one another, form a continuous line. It is hairless, smooth, slightly glossy, at first green, then reddish brown, and is of a spindle-shaped form, with a length of 3 millimetres, and a breadth and height of 1·2 millimetre; on the side next to the leaf it is fastened to the cleft in the midrib throughout its entire length by means of a narrow adherent clasp or border, whilst the gall of *N. ostreus* is only attached to the midrib at one point. This species is of great interest, as the detachment of the ripe gall from the leaf depends on the will of the contained larva. Collected galls, as yet attached to the leaf, at the beginning of October burst from it, jump and twist themselves, without the gall itself undergoing any change of form. This peculiar movement is occasioned thus: the larva, lying in the roomy cell, bends itself in a circular

manner, then quickly stretches, and thus brings about the displacement of the gall. Hitherto Dr. Giraud only has bred the fly, which he obtained in small numbers, partly in the following April and partly in the next October: thus a year after the decidence of the gall.—G. L. MAYR.

This Turkey oak, and consequently non-British, species is remarkable—as observed by Giraud, Kollar, and Mayr—on account of the spontaneous movements of its gall, the leaping larva reminding us of Dipterous habits. *Sapholytus Haimi*, Mayr, was obtained from the year-old galls by both Mayr and Haimhoffen in May and July. With respect to the appearance of the gall-flies, Dr. Giraud says he presumes they were retarded, owing to the unfavourable conditions under which the galls were kept.—E. A. FITCH.

69. *Neuroterus minutulus*, Gir.—I have two leaves from the collection of Herr v. Haimhoffen containing the pretty galls of this species. Dr. Giraud says that these galls occur on the under side of the leaves of *Quercus cerris*; but the specimens before me are on the fine reticulate veins of the upper side. They are spherical, about the size of a pin's head (1·2 to 1·5 millimetres in diameter), thickly covered with short conic-ovate tubercles, and of a rusty brown colour. There is a larva-cell in the interior. According to Dr. Giraud this gall appears at the end of October.—G. L. MAYR.

This, the smallest known oak-gall, is another Turkey oak species. Dr. Mayr gives the following additional information:—"On 24th October of this year (1872) I found the galls of this species in great numbers near Vienna, but always on the upper side of the leaf." The imago was described by Dr. Giraud from a dead specimen cut out of a gall.—E. A. FITCH.

NEW NATURAL HISTORY SOCIETY.—The Borough of Hackney Microscopical and Natural History Society was established on the 20th March, 1877. The objects of this Society are the cultivation of biological tastes in its district, and communication between members through its meetings, which are held twice a month, at 194, Mare Street, Hackney. Country excursions are frequently organised during the season. The honorary secretary is Mr. C. Willmott.—ED.

ON THE SPIDERS OF SCOTLAND; WITH A LIST OF SPECIES.

By the Rev. O. PICKARD-CAMBRIDGE, M.A., C.M.Z.S.

(Continued from p. 159.)

Fam. DICTYNIDES.

DICTYNA, *Sund.* = *Ergatis*, *Bl.**Dictyna arundinacea*, Linn. = *Ergatis benigna*, Bl. Aberdeen (J. W. H. T.); Orkneys (*id.*); Ben Nevis (O. P. C.); Berwickshire (J. H.).AMAUROBIUS, *C. L. Koch* = *Ciniflo*, *Bl., ad partem.**Amaurobius fenestralis*, Stroem. = *Ciniflo atrox*, Bl. Aberdeen, &c. (J. W. H. T.); Sutherlandshire (*id.*); Loch Katrine, Loch Rannoch, &c. (O. P. C.); Glasgow (H. C. Y.); Castle Douglas (W. D. R. D.).*A. similis*, Bl. In various localities from Edinburgh to Inverness (O. P. C.).

Fam. AGELENIDES.

CÆLOTES, *Bl.**Cælotes atropos*, Walck. = *C. savatilis*, Bl. Cheviots (J. H.); Castle Douglas (W. D. R. D.).TEGENARIA, *Latr.**Tegenaria Derhamii*, Scop. = *T. civilis*, Bl. Edinburgh, Trosachs, &c. (O. P. C.); Glasgow (C. H. Y.); Castle Douglas (W. D. R. D.); Berwickshire (J. H.).TEXTRIX, *Sund.**Textrix denticulata*, Oliv. = *T. lycosina*, Bl. Berwickshire (J. H.); Ben A'an, Ben Nevis, Loch Rannoch, &c. (O. P. C.); Sutherlandshire (J. W. H. T.); Aberdeen, Dunkeld (*id.*); Glasgow (C. H. Y.).CRYPTHÆCA, *Thor.* = *Tegenaria*, *Bl., ad partem.**Cryphæca silvicola*, C. L. Koch. Paisley (M. Y.); Aberdeen, Lintrathen, Dunkeld (J. W. H. T.); Berwickshire (J. H.); Pentlands and Loch Rannoch (O. P. C.).HAHNIA, *C. L. Koch* = *Agelena*, *Bl., ad partem.**Hahnia montana*, Bl. Pentlands (O. P. C.); Berwickshire (J. H.); Dunkeld (J. W. H. T.); Castle Douglas (W. D. R. D.).*H. elegans*, Bl. Cold Martin Moss, Berwickshire (J. H.).

Fam. THERIDIIDES.

PHOLCOMMA, *Thor.* = *Theridion*, *Bl.*, *ad partem*.

Pholcomma gibbum, Westr. = *Theridion projectum*, Cambr. Cheviots (J. H.); near Aberdeen and Inverury (J. W. H. T.); Paisley (M. Y.).

THERIDION, *Walck.* = *Theridion*, *Bl.*, *ad partem*.

Theridion tepidaricrum, C. L. Koch. Edinburgh, in greenhouses at the Botanic Gardens (O. P. C.); Castle Douglas, in a similar situation (W. D. R. D.). I have only on one occasion found this species in any other situation than in a greenhouse, hothouse, or conservatory, and that was in the kitchen-garden at the Rectory, Bloxworth, Dorsetshire, in the summer of 1869, when I found an adult male in a bed of carrots. There is no greenhouse or conservatory of any kind whatever in the parish, nor within three miles of the spot where this example occurred.

T. sisyprium, Clerck = *T. nervosum*, Bl. Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.); Berwickshire (J. H.); everywhere (J. W. H. T.); Sutherlandshire (*id.*); Trosachs, Loch Rannoch, Edinburgh, and Dalswinton, Dumfries (O. P. C.).

T. denticulatum, Walck. Dunkeld and Inverury (J. W. H. T.).

T. varians, Hahn. Dunkeld (J. W. H. T.); Dalswinton (O. P. C.).

T. pictum, C. L. Koch. Dunkeld (J. W. H. T.).

T. pallens, Bl. Dunkeld and Inverury (J. W. H. T.); Paisley (M. Y.); Peasedean, Berwickshire (J. H.).

NESTICUS, *Thor.* = *Linyphia*, *Bl.*, *ad partem*.

Nesticus cellulanus, Clerck = *Linyphia crypticolens*, Bl. Berwickshire (J. H.); Glasgow (H. C. Y.).

PHYLLONETHIS, *Thor.*, = *Theridion*, *Bl.*, *ad partem*.

Phyllonethis lineata, Clerck. Trosachs (O. P. C.); generally distributed, Aberdeen district (J. W. H. T.); Glasgow (H. C. Y.); Berwickshire (J. H.).

EURYOPIS, *Menge* = *Theridion*, *Bl.*, *ad partem*.

Euryopis flavomaculata, C. L. Koch. Paisley (M. Y.).

ASAGENA, *Sund.* = *Theridion*, *Bl.*, *ad partem*.

Asagena phalerata, Panz. = *Theridion signatum*, Bl. Berwickshire (J. H.).

ERIGONE, Sav. = *Neriëne*, Blackw., *ad partem.*, and *Walckenaera* (*id.*).

Erigone atra, Bl. = *N. longipalpis*, Bl., + *E. vagabunda*, Westw. Berwickshire (J. H.); numerous localities (O. P. C.); near Aberdeen, and Stanley, near Perth (J. W. H. T.).

E. promiscua (Cambr.). Cheviots (J. H.); found afterwards among examples of *E. longipalpis*, exact locality therefore not known (O. P. C.); Braemar, Inverury, and Dunkeld (J. W. H. T.).

E. longipalpis, Sund. Near Aberdeen and Inverury (J. W. H. T.).

E. dentipalpis, Wider. Near Aberdeen (J. W. H. T.); Berwickshire (J. H.).

E. graminicola, Sund. Banchory (J. W. H. T.).

E. pascalis (Cambr.). Near Dunkeld (J. W. H. T.); Sutherland (*id.*).

E. nigra, Bl. Near Aberdeen and Inverury (J. W. H. T.).

E. tibialis, Bl. Cheviots (J. H.).

E. longimana, C. L. Koch = *N. vagans*, Bl. Ben Nevis (O. P. C.); near Aberdeen (J. W. H. T.); near Edinburgh (O. P. C.); Cheviots (J. H.).

E. pygmæa, Bl. Berwickshire (J. H.); Ross-shire (J. F. M.); Paisley (M. Y.).

E. rubens (Bl.). Cheviots (J. H.); Ross-shire (J. F. M.); Orkney (J. W. H. T.); generally distributed (*id.*); Glasgow (H. C. Y.).

E. isabellina, C. L. Koch = *N. rubella*, Bl. Berwickshire (J. H.).

E. dentata, Wid. Near Aberdeen (J. W. H. T.).

E. agrestis, Bl. Berwickshire (J. H.); near Aberdeen (J. W. H. T.).

E. retusa, Westr. = *N. elevata*, Cambr. Berwickshire (J. H.); Paisley (M. Y.).

E. uncata, Cambr. Cairn na Glaisha (J. W. H. T.).

E. gibbosa, Bl. Cheviots (J. H.).

E. apicata, Bl. Paisley (M. Y.).

E. bituberculata, Wider. Near Aberdeen (J. W. H. T.); Paisley (M. Y.); Old Cambus by Cockburnspath (J. H.).

E. excisa, Cambr. Paisley (M. Y.); Berwickshire (J. H.).

E. latebricola, Cambr. Paisley (M. Y.).

Erigone Clarkii, Cambr. Paisley (M. Y.).

E. neglecta, Cambr. Paisley (M. Y.).

E. livida, Bl. Berwickshire (J. H.); near Aberdeen, Lintrathen, Orkney, and Sutherland (J. W. H. T.); near Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).

E. rufa, Wider = *N. rubripes*, Bl. Loch Katrine (O. P. C.); Cheviots (J. H.).

E. abnormis, Bl. Paisley (M. Y.).

E. saxatilis, Bl. Paisley (M. Y.).

E. viaria, Bl. Humbleton Hill, Berwickshire (J. H.); near Aberdeen (J. W. H. T.).

E. sylvatica, Bl. Berwickshire (J. H.).

E. fuscipalpis, C. L. Koch = *N. gracilis*, Bl., and *N. flavipes*, Bl. Berwickshire (J. H.); Dalswinton (O. P. C.); near Aberdeen and Dunkeld (J. W. H. T.); Paisley (M. Y.).

E. sublimis, Cambr. Cheviots (J. H.).

E. conigera, Cambr. Near Aberdeen (J. W. H. T., sub. *N. conigera*); Berwickshire (J. H.), inadvertently omitted in list of Berwickshire and Northumberland spiders, 1875; and Old Cambus (*id.*).

E. Douglasii, Cambr. Near Castle Douglas (W. D. R. D.)

E. pavitans, Cambr. Cheviots (J. H.).

E. clara, Cambr. Cheviots (J. H.); Orkney (J. W. H. T.).

E. pudens, Cambr. Cheviots (J. H.).

E. morula, Cambr. Cheviots (J. H.).

ERIGONE (*Walckenaera*, Blackw.).

Erigone brevis, Wider. = *W. depressa*, Bl. Berwickshire (J. H.); Paisley (M. Y.); Arthur's Seat (O. P. C.).

E. brevipes, Westr. Near Aberdeen and Inverury (J. W. H. T.).

E. incurvata, Cambr. Near Aberdeen (J. W. H. T.).

E. Hardii, Bl. Berwickshire (J. H.).

E. cuspidata, Bl. Berwickshire (J. H.); near Castle Douglas (W. D. R. D.).

E. obtusa (Bl.). Berwickshire (J. H.).

E. nudipalpis. Berwickshire (J. H.); Paisley (M. Y.).

E. punctata, Bl. Paisley (M. Y.); near Aberdeen and Inverury (J. W. H. T.); Berwickshire (J. H.).

E. bicolor, Bl. Arthur's Seat (O. P. C.).

E. bifrons, Bl. Cheviots (J. H.); Inverury (J. W. H. T.).

E. humilis, Bl. On pavements, Edinburgh (O. P. C.).

Erigone cristata, Bl. Dunkeld (J. W. H. T.); Paisley (M. Y.).

E. antica, Wid. Berwickshire (J. H.); near Aberdeen (J. W. H. T.); Paisley (M. Y.).

E. permixta, Cambr. Berwickshire (J. H.); near Aberdeen (J. W. H. T.).

E. fuscipes, Bl. Berwickshire (J. H.); Paisley (M. Y.); Castle Douglas (W. D. R. D.).

E. scabricula, Westr. = *W. aggeris* (Cambr.). Dunkeld (J. W. H. T.).

E. pumila, Bl. Berwickshire (J. H.).

E. latifrons, Cambr. Cheviots (J. H.); Paisley (M. Y.).

E. Beckii, Cambr. Dunkeld (J. W. H. T.).

E. picina, Bl. Paisley (M. Y.).

E. pusilla, Wider. = *W. minima*, Cambr. Inverury (J. W. H. T.).

E. erythropus, Westr. = *W. borealis*, Cambr. Pentlands (O. P. C.).

E. nemoralis, Bl. Berwickshire (J. H.); Dunkeld (J. W. H. T.).

E. similis, Cambr. Near Aberdeen (J. W. H. T.).

E. ludicra, Cambr. Pease Dean, Berwickshire (J. H.).

E. trifrons, Cambr. Cheviots (J. H.).

E. fontata, Bl. Berwickshire (J. H.); near Aberdeen, Inverury, and Dunkeld (J. W. H. T.); Paisley (M. Y.).

E. acuminata, Bl. Berwickshire (J. H.); near Loch Katrine Head (O. P. C.); near Aberdeen (J. W. H. T.); Glasgow (H. C. Y.).

PACHYGNATHA, Sund.

Pachygnatha Clerckii, Sund. Berwickshire (J. H.); Aberdeenshire and Dunkeld (J. W. H. T.); Glasgow (H. C. Y.).

P. Degeerii, Sund. Arthur's Seat (O. P. C.); everywhere (J. W. H. T.); Glasgow (H. C. Y.); Castle Douglas (W. D. R. D.).

TAPINOPA, Westr. = Linyphia, Bl., ad partem.

Tapinopa longidens, Wid. Near head of Loch Katrine (O. P. C.); Cheviots (J. H.).

T. unicolor, Cambr. Pease Dean, Berwickshire (J. H.); Paisley (M. Y.).

LINYPHIA, Latr. = Linyphia, Bl., ad partem., and Neriëne, Bl., ad partem.

Linyphia thoracica, Wider. = *L. cauta*, Bl. Falls of Foyers (O. P. C.); near Castle Douglas (W. D. R. D.); Dunkeld (J. W. H. T.); Berwickshire (J. H.).

L. leprosa, Ohl. = *L. confusa*, Cambr. Berwickshire (J. H.); near Aberdeen (J. W. H. T.).

L. minuta, Bl. Trosachs and other localities (O. P. C.); Berwickshire (J. H.).

L. tenebricola, Wider. = *L. terricola*, Bl., and *L. tenuis*, Bl. Ross-shire (J. F. M.); Inversnaid (O. P. C.); Glasgow (H. C. Y.); Dunkeld (J. W. H. T.); near Castle Douglas (W. D. R. D.); Paisley (M. Y.).

L. obscura, Bl. Pentlands (O. P. C.); near Aberdeen (J. W. H. T.); Cheviots (J. H.); Glasgow (H. C. Y.); Paisley (M. Y.).

L. variegata, Bl. (sub. *Neriëne*, Bl.). Ross-shire (J. F. M.); Arthur's Seat (O. P. C.); Berwickshire (J. H.); Glasgow (H. C. Y.); Sutherlandshire (J. W. H. T.).

L. expuncta, Cambr. = *L. lepida*, Cambr. Dunkeld (J. W. H. T.).

L. alacris, Bl. Berwickshire (J. H.); near Aberdeen and Lintrathen (J. W. H. T.); Paisley (M. Y.).

L. socialis, Sund. Ben A'an (O. P. C.); near Aberdeen and Lintrathen (J. W. H. T.); Glasgow (H. C. Y.); Berwickshire (J. H.).

L. luteola, Bl. = *L. alticeps*, Bl. Ross-shire (J. F. M.); Berwickshire (J. H.); Strathdon and near Aberdeen (J. W. H. F.); Paisley (M. Y.).

L. alticeps, Sund. Berwickshire (J. H.); Orkney and Braemar (J. W. H. T.).

L. cristata, Menge. (sub. *Bathypantes*, Menge). Berwickshire (J. H.).

L. explicata, Cambr. = *L. decolor*, Cambr. Near Castle Douglas (W. D. R. D.).

L. nigrina, Westr. = *L. pulla*, Bl. Berwickshire (J. H.); near Aberdeen (J. W. H. T.).

L. approximata, Cambr. Berwickshire (J. H.).

L. dorsalis, Wid. = *L. anthracina*, Bl., and *L. Claytoniæ*, Bl. Loch Rannoch (O. P. C.); Paisley (M. Y.).

L. ericæa, Bl. Berwickshire (J. H.); near Aberdeen (J. W. H. T.); Paisley (M. Y.).

L. circumspecta, Bl. Berwickshire (J. H.); near Aberdeen (J. W. H. T.); Paisley (M. Y.).

Linyphia angulipalpis, Westr. Cheviots (J. H.).

L. experta, Cambr. Cheviots (J. H.).

L. rufa, Westr. Cheviots (J. H.); near Aberdeen and Braemar (J. W. H. T.).

L. bicolor, Bl., sub. *Neriëne*, Bl. Generally distributed. Berwickshire (J. H.); near Aberdeen and Dunkeld (J. W. H. T.); near Castle Douglas (W. D. R. D.).

L. linguata, Cambr. Berwickshire (J. H.).

L. reticulata, Cambr. Cheviots (J. H.); Cairn na Glaisher, Aberdeen, and Sutherland (J. W. H. T.).

L. pudens, Cambr. Cheviots (J. H.).

L. arcana, Cambr. Cheviots (J. H.).

L. contrita, Cambr. Cheviots (J. H.).

L. decens, Cambr. Cheviots, and Old Cambus by Cockburnspath (J. H.).

L. concolor, Wid. = *Theridion filipes*, Bl. Berwickshire (J. H.); Loch Rannoch (O. P. C., sub. *Theridion*), Glasgow (H. C. Y.); Paisley (M. Y.).

L. insignis, Bl. Dunkeld (J. W. H. T.); Berwickshire (J. H.).

L. clathrata, Sund. = *Neriëne marginata*, Bl. Trosachs (O. P. C., sub. *Neriëne*); Berwickshire (J. H.); near Aberdeen (J. W. H. T., sub. *Neriëne*); Glasgow (H. C. Y.).

L. bucculenta, Clerck = *Neriëne trilineata*, Bl. Trosachs (O. P. C., sub. *Neriëne*); Aberdeenshire; Stanley (J. W. H. T., sub. *Neriëne*); Berwickshire (J. H.); near Castle Douglas (W. D. R. D.).

L. marginata, C. L. Koch. = *L. triangularis*, Bl. Trosachs (O. P. C.); Berwickshire (J. H.); Paisley (M. Y.).

L. triangularis, Clerck = *L. montana*, Bl. Generally distributed (J. W. H. T.); Trosachs and Loch Rannoch (O. P. C.); Glasgow (H. C. Y.); Berwickshire (J. H.).

L. peltata, Wid. = *L. rubea*, Bl. Near Aberdeen (J. W. H. T., sub. *L. rubea*); Ross-shire and Sutherland (J. F. M.); Glasgow (H. C. Y.); Berwickshire (J. H.).

L. pusilla, Sund. = *L. fuliginea*, Bl. Loch Rannoch, Black Forest (O. P. C.); Dunkeld, Sutherlandshire, and Aberdeenshire (J. W. H. T., sub. *L. fuliginea*); Glasgow (H. C. Y.).

L. hortensis, Sund. = *L. pratensis*, Bl. Aberdeenshire and Dunkeld (J. W. H. T.); Berwickshire (J. H.); Paisley (M. Y.).

ERO, *C. L. Koch.* = *Theridion*, *Bl., ad partem.*

Ero thoracica, Wid. = *Theridion variegatum*, Bl. Near Aberdeen (J. W. H. T.).

(To be continued.)

AN ABSTRACT OF A PAPER BY
DR. H. GRENACHER ON THE EYES OF ARTHROPODS.

By B. THOMPSON LOWNE, F.R.C.S.,

Ophthalmic Surgeon to the Great Northern Hospital; Lecturer on Anatomy and Physiology in the Royal College of Surgeons; Lecturer on Anatomy and Physiology at the Middlesex Hospital Medical School; &c.

DR. GRENACHER has published a very important and interesting *resumé* of his researches on the structure and functions of the eyes of insects, Arachnida and Crustaceans; an abstract of which can hardly fail to be of interest to entomologists.

It is well known that there are two rival theories as to the manner in which the compound eyes of these animals perform their function; the earlier, that of Johannes Müller, propounded fifty years ago, which has had few supporters of late years, is that each portion of the compound eye forms an element of the picture, the lenticular condition of the facet being immaterial to its production; only a straight ray of light having the same direction as the tube which forms the posterior part of the segment of the eye being utilised in the production of the impression, each segment giving rise to a single nerve stimulus only.

The second theory is that each segment of the compound eye produces a distinct inverted image of the object, just as the simple eyes of insects, the eyes of vertebrates and other animals do; a view which originated in the well-known experiment of Gottsche, who first showed the multiple inverted images, which the facets of the cornea are capable of producing, with the microscope. This theory has been almost universally adopted,—amongst others by myself,—only Boll and Leuckart having written in favour of Müller's view; yet Dr. Grenacher has shown that the adoption of this view has been too hasty, and that without any doubt Müller was right and his adversaries wrong.

I. THE STRUCTURE OF THE OCELLI.

Dr. Grenacher has investigated these organs in the larva of *Dytiscus* and *Acilius*, in several spiders, and in some perfect insects; and he shows, as Leydig did, only more completely, that there is an important relation between the structure of these organs and that of the compound eye.

The simplest ocelli are those of the larva of *Dytiscus*—the cuticle is swollen slightly to form the lens; the other structures of the eye, the vitreous and the retina with its pigment, are manifestly differentiations of the hypodermis, or cellular layer of the integument: in the young larva, the passage from the ordinary hypodermis to the cells of the vitreous is quite gradual; the pigment, which serves as a choroid, is contained at the outer ends of the cells which form the vitreous; it surrounds the nuclei of these cells; the retina consists of a series of fusiform cells, which are apparently only slightly differentiated from the cells of the vitreous body, but which are furnished with a well-developed layer of rods, so placed that they receive the image formed by the lens upon their surface.

In the eyes, stemmata, of the larva of *Acilius*, there is a very considerable advance; the lens is very convex, and the vitreous is more decidedly differentiated from the hypodermis. The retina also exhibits a very remarkable peculiarity; it is deeply cleft by a fissure, extending almost through its entire thickness, both the walls of which are lined by a series of gigantic, but evidently true rods—a condition which reminds us of the yellow spot in the axis of the human eye, at least as far as their probable function is concerned.

In spiders and *Phalangidæ* the principal difference in the ocelli, as compared with those of the already described larvæ, is that the retina is more strongly differentiated from the cells of the vitreous and hypodermis. The most remarkable peculiarity in the eyes of spiders is their dimorphism, the same insect having two sets of eyes with very different retinal structure: as an example of this, Dr. Grenacher figures and describes the two forms of eye met with in the common garden spider, *Epeira diadema*; in the anterior eyes the retinal cells are much elongated, and bear at their inner extremities a layer of very small rods, closely abutting

on the cells of the vitreous. The cells of the retina have their nuclei situated very far back; these eyes have also a sling-shaped muscle, which seems to have the function of altering the distance between the retina and the lens. The posterior eyes have no layer of rods between the retina and the vitreous, but the cells of the retina are very large, and have their nuclei at their anterior ends: they enclose very large prism-shaped bodies in their interior at some distance behind the nuclei, which Dr. Grenacher regards as percipient rods. These eyes have no muscle.

In the genus *Lycosa* the four small eyes on the forehead belong to the first kind, whilst the four great dorsal eyes belong to the second.

In the genus *Salticus* the latter form of eye is extraordinarily well developed; six of the eight eyes belong to this category, the anterior four occupying almost the whole margin of the cephalothorax.

In the simple eyes of perfect insects the retina is formed on the same type as in the first form of eyes in the spiders, but the vitreous is in general very little developed, so that the rods of the retina almost touch the posterior surface of the lens; an exception to this is seen in the single stemma of the flea, where the cells of the vitreous are comparatively well developed; they are also more strongly developed in the blow-fly than in most other insects, but they are not so well developed in it as in the flea.

(To be continued.)

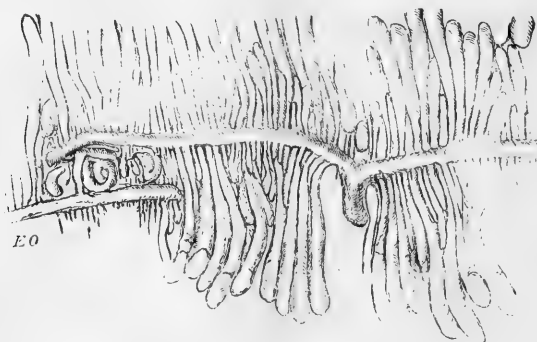
WORKINGS OF HYLESINUS FRAXINI.

By E. A. ORMEROD.

IN the spring of 1875, the ash-boring beetles (*Hylesinus fraxini*) appeared in such numbers on the trunks of some newly-felled ash trees in the neighbourhood of Isleworth, as to give an opportunity of watching their method of operation and rate of progress, and a short note may be of interest from their difference in some particulars to those of the well-known *Scolyti* of the elm.

The *H. fraxini* is mentioned by Stephens and Selby as occurring in decayed ash trees, and by E. Newman (Entom.

viii. 186) as attacking young trees, but in the instance near Isleworth the trees had grown to their average height, and were about a foot in diameter. Probably in this case the damp locality of the spot where the trees had grown, and were laid, facilitated the boring operation, especially on the lower side of the timber next the grass, which was the part chiefly affected. The beetles appeared to attack the smooth surface or any of the slight fissures indifferently, as a commencement point for their burrows, whilst the elm *Scolyti* have been noted as usually taking advantage for their start of the cracks or crevices of the rough elm bark.



WORKINGS OF *HYLESINUS FRAXINI*.

The work was begun about the 19th of April, the beetles being then wandering in great numbers over the timber, till an appropriate spot being found and the boring commenced, the beetle continued firmly at its work irrespective of any disturbance. In four days the *Hylesini* had disappeared, the only signs of their presence being the ejected results outside of their borings inside the bark. The progress was very slow, in captivity the advance of the beetle being only about half its own length in from ten to twelve hours; in natural circumstances, rarely more than half an inch in the ten days after first observation of the insects. The work was begun by a single beetle drilling a circular bore just large enough to allow of its passage, where it was shortly joined by its companion—the pair presumably working

in concert at the excavations, as the tunnel being always free of incumbrance, and occupied by both *Hylesini*, the rubbish could hardly otherwise have been passed from the hole. At about half an inch at most from the entrance the tunnel bifurcated (and pairing appeared to take place), the two new tunnels being carried slowly on to right and left, and almost at right angles with the first entrance passage, till in about five weeks they were at their full length, the burrow having the appearance (as given in the figure) of a T,



with truncate stem and elongated slightly arched arms of various length, but not exceeding two inches. For the most part, during this time, one beetle was to be found in each of the side galleries, but occasionally they were together, and sometimes a third was present, the burrowings being entirely inside the bark, so as to impinge chiefly on the bark itself, but to leave a narrow white line along the floor, where the removal of a narrow strip laid bare the white wood of the tree.

By the 4th of July most of the *Hylesini* were dead in their burrows, and a few of the channels of the larvæ begun, but not as yet in more than one of each pair of galleries; and, about three weeks later, these larval tunnels might be found completed—usually placed side by side and at right angles, as far as circumstances allowed, of both the side galleries pierced by the parent beetles. This arrangement is a material check on the increase of the beetles, as the larval galleries start so closely side by side under common circumstances as only to leave space for the larvæ in the earliest stages of their existence; with increase of growth more room is needed. The strongest or swiftest get ahead of their neighbours, and taking possession of the accommodation, leave the weaker grubs to perish; and their tunnels may be seen thinning into non-existence between the steadily increasing size of those on either hand, so that of the larvæ that start evenly from the egg frequently scarcely half the

number find room for development. In this respect the difference between burrowings of some of the species of *Hylesini* and the elm *Scolyti* is very marked, the larval channels of the *Scolyti* frequently feathering in contorted waves and in every direction after their first start from the mother gallery, reaching a length at times (as in the specimen before me) of as much as five inches, the mother gallery being, I believe, always commenced at one extremity, and uniform in its course throughout.

In soft or decayed bark, the larval galleries of the *Scolyti* cross each other not unfrequently. In the *H. fraxini* the mother gallery, bifurcated from the more or less centrally placed passage of entrance (which may be found sometimes pointing along, as well as across the timber on which it is placed), has the larval branches placed on each side with the utmost regularity in all the specimens I have seen, for the most part pointing straight from the original gallery, neither crossing nor blending with one another, and rarely exceeding in the case of borings in the fresh wood (which are the only ones I have had the opportunity of examining thoroughly) about an inch in length. This regularity of position is still more striking in the borings of *H. vittatus*, where the larval channels may be found placed longitudinally with almost mathematical precision, and is shortly noticed by Kaltenbach in his 'Pflanzenfeinde,' p. 535.

Where the larvæ of the *H. fraxini* start side by side thirteen may be counted to the half inch, whilst of those who survive to the journey's end only seven can find necessary room. Occasionally some unexplained disaster occurs to a whole line of eggs or brood in its very first stage, for the shiny specks may be found each in its own packing along the side of the gallery, but without the external gummy skin which forms the usual protection of the egg chamber, projecting slightly like minute studs along each side of the tunnels formed by the parent beetles. The egg appears never to be deposited by the side of the entrance passage, and rarely just above the fork, the space afforded being usually occupied by larval passages parallel to the first, and pupal chambers running close up to the second, as shown in the sketch.

How far the nutriment of the grub, or its power of

gnawing, necessitates its remaining in the Cambium region, between the bark and wood of recently-felled timber, may be uncertain, but the larval course (like that of the parent *Hylesini*) was invariably inside the bark, slightly infringing on the wood at the extremity of the course for the oval cell to accommodate the pupal change. This change had commenced about the 24th of July—that is, about three months from the first appearance of the *Hylesini* in April, the pupæ being then fairly numerous, in the cells at the extremity of the channelings, tightly filled throughout (down to the shiny exterior of the egg chamber projecting into the empty main gallery) with the rejected remains of their excavation. The full development to the beetle state began about three weeks later, continuing over a lengthened period.

The illustration is mainly sketched on a rubbing from a specimen of the galleries exposed by removing the bark, so as to be almost an exact *facsimile*, and shows the large proportion of larvæ which perish from want of room; and the occasional contortion of the course of one larva, where the close contiguity of the mother-galleries has caused the destruction of almost all the larvæ in the enclosed space.

Spring Grove, near Isleworth, May 2, 1877.

ON THE ABNORMAL APPEARANCE OF COLIAS EDUSA AND OTHER DIURNAL LEPIDOPTERA IN 1877.

By JOHN T. CARRINGTON.

So many have been the communications to the 'Entomologist' on this subject during the past month that I think it worthy of some remark. Excepting in the extreme north of these islands the past winter was one of exceptional mildness, with more than the average rainfall. This was followed by a cold spring, and a predominance of continued easterly wind, which even at the time of writing has not changed. Latterly, however, bright skies and brilliant sunshine have made the days hot, while the nights have still been comparatively cold. I hear from correspondents in many parts of the country that this may be considered as yet a late season: several species now due have not as yet

appeared. Still more remarkable then is the extraordinary abundance of what are usually termed "hibernated butterflies." So they may be; but when I carefully examine the reports I almost conclude that from some unknown or unobserved cause many of these examples have passed the winter in the pupa state, and appeared in the early sunshine of this season. *Vanessa Atalanta*, *V. Urticæ* and *V. Io* appear to have been common in most localities, while *Pyrameis cardui* seems to have been more common this June than it has been in autumn for many years past. I had the pleasure of counting one day this week, and after six o'clock in the evening, seventy-five specimens during a walk of five miles on the Essex coast. *Vanessa Antiopa* has been recorded once, as observed near Scarborough. The most remarkable appearance this season is that of *Colias Edusa*. This butterfly has been seen in greater or less numbers during June all over the kingdom, from Central Scotland to Land's End; and is reported from some places where its occurrence has never previously been recorded. Most of our correspondents remark upon the exceeding freshness of the specimens captured, and some speak of an exceptional rosy purple tinge suffused over the ordinary yellow. From these observations, and from the fine ciliæ of several specimens kindly sent alive to me by various correspondents, I am tempted to think that they had only very recently emerged. I scarcely consider it right to call this species double-brooded, for I do not think it has passed through its various metamorphoses this spring, but only remained over winter in the pupa state. The question raised by this abnormal development is well worthy of further discussion. A very large number of communications on this subject have been sent to the 'Entomologist,' from which the following is a selection, as illustrating the geographical distribution of *Colias Edusa* this spring. Our correspondents' reports are condensed, as it would be impossible to find space for them all.

SURREY.—Abundant at New Maldon, first observed June 3rd; H. T. Dobson, jun. Redhill, June 4th, very bright in colour; Sydney Webb. Forest Hill, June 7th, fine specimens; H. Ramsay Cox. Barnes, large numbers, including var. *Helice*; F. M. Philips. Woking, large numbers; H. Goss. Norbiton, observed in such numbers as to cause

astonishment, and chiefly in fine condition; A. J. Windybank. Egham Lock, "abounds here"; R. E. Salwey. Caterham Junction; E. G. Browne.

KENT.—Beulah Hill and Nunhead Junction; S. Stevens. Shooter's Hill and Darenth Wood; E. G. Browne. Darenth Wood, several; H. C. Dent. Gravesend, commonly; Rev. P. H. Jennings. Eastbourne, considerable numbers, some fine as bred, and two var. *Helice*, June 7th; G. F. Gottwaltz.

ESSEX.—Maldon, quite common; Rev. J. W. Mills. Commonly; E. A. Fitch. Chingford, June 6th, very fine; R. L. Rolph. Loughton and Chingford, upwards of forty seen on one day, all fine; T. Eedle. Hackney Marshes, several, and one var. *Helice*; T. Eedle. Lea Bridge, June 17th, rather worn; G. Pearson.

MIDDLESEX.—June 1st and 4th, at Highgate and Hampstead; R. T. Gibbons.

WILTSHIRE.—Salisbury, commonly; H. C. Dent. Plentiful; Henry Neale.

SOMERSET.—Bath, commonly; H. C. Dent. Castle Cary, large numbers; W. Macmillan.

HERTS.—Knebworth, common, "not previously known to occur here"; B. Brown.

DORSET.—Near Bloxworth, on May 30th, and many subsequently; Rev. O. Pickard-Cambridge.

HAMPSHIRE.—Portsea, quite plentiful, in very fine condition and bright in colour, June 11th; R. J. Kent. New Forest, common; J. Jenner Weir. Winchester, up to June 8th quite abundant, and in fine condition; E. F. Johns. Isle of Wight, in profusion, June 3rd to 15th; V. R. Perkins. Common; J. Jenner Weir. Southampton, June 2nd, 3rd and 4th, common, and in fine condition; Rev. A. C. Hervey. "Literally swarmed, in the proportion of about one male to five females"; W. McRae.

SUSSEX.—Chichester, June 4th, abundant, some very fine with rosy purple lustre, also several var. *Helice*; Joseph Anderson, jun.

OXFORDSHIRE.—Oxford, several on June 9th and 10th; A. F. Hernaman. Windsor, common; W. A. Watson.

NORFOLK.—Thrupton, June 8th and 15th, common; H. Reeks.

CAMBRIDGESHIRE.—Chatteris, June 4th, one, “hibernated”; H. F. Fryer.

YORKSHIRE.—Scarborough, about June 3rd to 19th, “very bright in colour, not like hibernated”; W. Robinson and J. H. Rowntree. Leeds, fine specimens at Upper Wortley; T. Benn. Ilkley; Bernard Hartley.

LANCASHIRE.—Southport, June 3rd, several; G. Eastham. Middleton, six miles north of Manchester, in abundance; John Thorpe. Withington, near Manchester, several; A. Aspinwall. Bury; R. Kay.

DURHAM.—In considerable numbers (eighteen years since the last capture); J. E. Robson.

CARNARVON.—Llandudno, several; J. Carter.

DUMFRIESSHIRE.—Several, about 3rd and 4th June; W. Lennon.

I need only add that several contributors state the specimens seen were flying steadily from south-west to north-east, simply giving this statement without offering an opinion upon it.

Royal Aquarium, Westminster,
June 21, 1877.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

ON THE HIBERNATION OF BUTTERFLIES.—I was for a fortnight during the early part of this month at Brockenhurst, in the New Forest, and was particularly struck by observing on the wing numerous specimens of *Vanessa polychloros*, *Pyrameis cardui*, *Gonepteryx rhamni*, and *Colias Edusa*. The point that I am anxious for information on is whether these butterflies had passed the winter in the perfect or chrysalis state? Has anyone ever found a chrysalis of any of them in the winter months? It has always been my opinion that the *Vanessæ* hibernate in the imago state only, and that those which hibernate have remained torpid immediately after their emergence from the chrysalis, and have flown only to a place of concealment. I have found imagines of *Vanessa Urticæ* nearly a foot below the surface, in the crevices of chalk, when digging for fossils; and from the exposed position in which the chrysalids of the *Vanessæ*

are suspended I believe that none of that genus hibernate in the chrysalis state; but it may be different with the species of *Colias* and *Gonepteryx*.—J. JENNER WEIR; 6, Haddo Villas, Blackheath, June 22, 1877.

VANESSA ANTIOPA NEAR SCARBOROUGH.—On the 4th of this month, in Harwood Sale, eight miles off, I saw, and came within very little of capturing, a good specimen of *Vanessa Antiopa*. Being without net and near a river, which the insect crossed, I was obliged to be content with the sight for some five minutes of this the third specimen of this insect which I have seen in England.—W. ROBINSON; West Bank, Scarborough, June 12, 1877.

PAPILIO MACHAON AND COLIAS HYALE IN ESSEX.—One of my pupils has taken a specimen of *Papilio Machaon*, where the wild carrot grows in many parts on the Essex marshes. A few *Colias Hyale* have also been taken.—[Rev.] JOHN W. MILLS; St. Lawrence Rectory, near Maldon, Essex, June 18, 1877.

COLIAS HYALE IN ESSEX.—During the last two days I have seen two, if not three, specimens of *Colias Hyale* in South Essex.—E. A. FITCH; Maldon, June 9, 1877.

COLIAS HYALE.—On June 13th I captured a fine specimen of *Colias Hyale* (female) on the celebrated Runnymede, between Egham and Old Windsor.—R. E. SALWEY; Egham Lock, Surrey.

DEILEPHILA LINEATA.—On June 13th a specimen of *Deilephila lineata* was captured in a brick field about a mile from this town.—R. KAY; 2, Spring Street, Bury, June 18, 1877.

REVIEW.

Illustrations of Typical Specimens of Lepidoptera-Heterocera in the Collection of the British Museum. Part I. By ARTHUR GARDINER BUTLER. London. Printed by order of the Trustees, 1877. 4to; pp. xiii., 62; Twenty Coloured Plates.

THE present work is perhaps one of the most important which has been published by the Trustees of the British Museum upon Entomology. At the present day the literature

of every science is growing so fast that it is becoming almost impossible to keep up with it, and it is of the utmost importance that our progress should be sure as well as rapid. Hitherto the British Museum collection of moths has not been illustrated at all, though many hundreds (we might, perhaps, say thousands) of new species have been described from it by the late Mr. Walker. But the more species are described the more difficult becomes their identification, and where no figures of a species exist it is frequently almost impossible to identify it by description alone, even when it is correctly classified, well described, and its affinities carefully indicated, which is not always the case; indeed, some of our best Lepidopterists have gone the length of asserting that all descriptions unaccompanied by figures are worse than useless. Hence the importance of accurate figures being published of Mr. Walker's species during the lifetime of his contemporaries, and while most of his types are still readily determinable.

The volume now before us contains good coloured figures of upwards of two hundred moths, the greater number of which were originally described by Mr. Walker, and the remainder (including a few new species) chiefly by Mr. Butler. Of the twenty plates, three are devoted to *Castniidæ* and *Uraniidæ*, two to *Agaristidæ*, one to *Chalcosiidæ*, one to *Sphingidæ*, one to *Geometridæ* and *Pyrallidæ*, one to *Lithosiidæ*, &c., and the remainder entirely to *Zygænidæ* and *Arctiidæ*; all the species figured are fully described by Mr. Butler.

We congratulate the Museum authorities and the author upon the appearance of the first part of this very useful work, in which we hope that the greater number of types existing in the British Museum will ultimately be figured; and attractive as are the handsome species so well figured in the part now before us, we hope that the smaller and more obscure groups will also find a place in subsequent volumes, as their identification without figures is even more difficult. It is our firm conviction that the collation and extension of our knowledge concerning species already described is of far greater importance to the real interests of Science than the mere description of new species; and we are glad to see that the latter object has not been made a prominent feature of the work.

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[No. 171.

VARIETY OF MELITÆA ARTEMIS.



MELITÆA ARTEMIS (*var.*).

THE accompanying figure, drawn by Mr. Willis and engraved by Mr. Kirchner, represents a very curious variety of *Melitæa Artemis*, now in the collection of Mr. Samuel Stevens, of Upper Norwood. It was obtained by its present owner some years ago from an old British collection; but the precise locality of its capture is unknown.

AN ABSTRACT OF A PAPER BY
DR. H. GRENACHER ON THE EYES OF ARTHROPODS.

By B. THOMPSON LOWNE, F.R.C.S., &c.

(Concluded from p. 183.)

II. THE STRUCTURE OF THE FACETTED EYES.

THE compound eyes of insects and crustaceans exhibit great variety in their structure: the author describes them under three distinct groups, which he names—1. Aconic eyes. 2. Pseudoconic eyes. 3. Euconic eyes.

They have been described by former observers as consisting of—1. A cornea, with more or less numerous facets. 2. A crystal-like cone behind each corneal facet, composed of four cells united to each other, the primitive existence of

the four cells being usually indicated, in the imago, by the persistence of four nuclei which lie immediately behind the facet of the cornea. 3. The recipient rod, connected more or less intimately with the inner extremity of the crystal cone. These bodies, as is well known, converge towards the optic ganglia, and form the greater part of the radiating structure of the eyes. The author proposes the terms *retinula* and *rhabdom* to designate the parts of this structure, which exhibits a very different condition in the different forms of compound eyes. 4. The pigment cells which surround the crystal cone and the recipient rod.

1. *Aconic Eyes*.—In these the primitive cells of the crystal cone remain distinct throughout life, so that this organ cannot be said to be developed. These cells are so arranged that they form a funnel-shaped body, narrow at its inner extremity, which is closely surrounded by pigment, so that only a very small clear space is left at its apex opposite the centre of the corresponding facet. The *retinula* consists of seven cells, which are parallel or nearly parallel, except at their outer extremities, where they curve towards each other, so that the rods which they have imbedded in their substance approach the opening in the pigment. The axial cell of the *retinula* is most strongly developed, and appears alone to be connected with the optic nerve by a single nerve fibre. The rods which are contained in these cells are enlarged at their outer extremities, and terminate in points behind. The nematocerous *Diptera*, the *Cimicidæ*, the *Dermaptera*, and apparently all the *Coleoptera*, except the *Pentamera*, have aconic eyes.

2. *Pseudoconic Eyes*.—Dr. Grenacher describes the eye of *Tabanus bovinus* as a typical example; it is characterised by the existence of a conical space enclosed in front by the facet of the cornea; behind by four nucleated cells, corresponding to those immediately behind the cornea in the aconic eye, and surrounded by two large thin pigment cells. This space is filled during life with a clear fluid, which contains but little coagulable substance; it represents the crystal cone of the euconic eye, but it cannot be considered to represent it morphologically, as it lies outside the nucleated crystal cells. The *retinula* consists as before of seven elongated cells, but these are united so as to form a tube

which extends from the crystal body to the optic nerve; the cells are distinctly nucleated, and the tube which they form contains seven long thread-like rods, which are attached to its inner surface. In *Musca vomitoria* the outer extremities of the rods are somewhat thickened, are less highly refractive, and pass between the cells of the crystal body. These were mistaken by M. Schultze for a fasciculus of fine nerve fibres. Pseudoconic eyes are found in all the true *Diptera* (*Heterocera*).

3. *Euconic Eyes*.—Those in which a crystal-like body is found between the retinula and the facet of the cornea formed by the fusion of the four cells already mentioned: the nuclei of these cells are found between this structure and the cornea, at least when they can still be recognized. In the greater number of these eyes the number of cellular elements which form the retinula is still seven. There are, however, many deviations from this number. In bees and hornets there are eight cells, as there are also in a great exotic species of *Cicada*. In *Orthoptera* and in Geodephagous and Hydradephagous *Coleoptera* there are four; in some of the latter, however, there are certainly more than four, but only four take any part in the formation of the rods. In the diurnal *Lepidoptera* the estimation of the number of component cells is so difficult, owing to their intimate fusion, that the author states that he can say nothing certain about it. In the euconic eye the cells of the retinula are united into a tube which closely surrounds the rhabdom, an angular rod consisting of the united rods of the retinal elements. In some pentamerous *Coleoptera*, the *Orthoptera*, *Hymenoptera*, *Cicadae*, dragonflies, and diurnal *Lepidoptera*, the retinula is of nearly equal thickness, except that it is slightly narrowed within on account of the radial arrangement of these organs. In these insects the rhabdom is not remarkably modified in any part of its course. In the *Crepuscularia* and in the *Nocturna*, in some *Coleoptera* and in the *Phryganidae*, it usually exhibits two swellings—a smaller conical swelling immediately behind the crystal cone, and a more considerable enlargement at its inner extremity. The outer swelling contains the nuclei of the retinula; and the posterior is remarkable from the manner in which the rhabdom sends broad plate-like processes between the constituent cells, so that in

section it exhibits a stellate appearance. In the Crustacea the structure of the faceted eyes is in the main the same as that of the euconic eyes of insects; but the number of the cells from which the crystal-cone is developed is variable. In the great majority of the Crustacea there are four, as in insects, but there are only two in Amphipods, *Gammarus* and *Hyperina*; in Isopods, *Asellina* and *Oniscoidea*; and in Schizopods, *Mysis*; there are five in the Cladocera, *Daphnia*, &c.; and in the Phylopodous genus, *Estheria*; but there are only four in *Apus* and *Branchipus*. The number of elements in the retinula is also variable; there are usually seven, as in the majority of insects; there are only five in *Hyperinis*, *Apus*, and *Branchipus*; and four in *Gammarus*. Each retinula appears externally to have the same form throughout its entire length; but in many genera the rhabdome shows enlargements, which are stellate in section, as in insects.

III. ON THE MORPHOLOGICAL RELATIONS OF THE SIMPLE AND COMPOUND EYES.

Aconic eyes are comparable in structure to the simple ocelli; each consists of a transparent lenticular swelling of the cuticle, of certain modified cells of the hypodermis, the vitreous in the ocellus and the crystal cells of the aconic eye, and of the retina in the ocellus and the retinula in the compound eye. Dr. Grenacher concludes that the two forms of eye are the result of the modification, in two opposite directions, of a primitive but rudimentary type; in the one the tendency has been towards the multiplication of retinal elements and the perfecting of a dioptric apparatus; in the other towards the reduction of the retinal elements to a single receptive structure, which attains its highest form in the rhabdome of the euconic eye—the lens remaining as a rudimentary structure, or being altogether lost as in the *Hyperidæ*, the perfection of the compound eye being attained by the multiplication of the component ocellulæ.

IV. ON THE FUNCTION OF THE COMPOUND EYE.

As has been already stated, Dr. Grenacher returns to the theory of Johannes Müller; and it will be seen that the anatomy of the compound eye is entirely in favour of the

view. The great depth at which the percipient structures lie, especially in the euconic eye, added to the fact that the greater part of the picture formed by the lens is shut off from the retinula by a dense layer of pigment, which is only performed by a minute opening in the axis of the ocellulus, are diametrically opposed to the dioptric theory: moreover, the depth at which the small image is formed by the corneal facet does not correspond to that of the recipient organ. The further facts in favour of Müller's theory, adduced by the author, are that the highest perfection of the compound eye is attained in the great multiplication of the number of component ocellulæ, and in the fusion of the percipient structures of each into a single organ connected with a single nerve filament; and that the corneal facets in the *Hyperideæ* are incapable of forming any picture, although no one can suppose the sense of vision in these crustaceans is of an imperfect character.

NOTE BY THE TRANSLATOR.—Some years ago, whilst investigating the structure of the compound eye of the blow-fly, I was led to take the view that the dioptric theory was the true one; but I am completely convinced, by the valuable researches of Dr. Grenacher, that I was wrong in so doing; I never, however, expressed myself very strongly on the point, but distinctly stated that the subject was one which, for a time at least, must remain uncertain. There is one strong point which has not been mentioned by Dr. Grenacher, or as far as I know by any one, although it cannot fail to have occurred to the author of this monograph; it is, that the existence of a large number—many thousand—components of the picture, each one of which is reversed, would require some very special modification of the nervous apparatus to produce a general picture, the parts of which retain the same relations they possess in the reality. No doubt a decussation of nerve fibres is possible, which should reverse the reversed components of the picture; each facet, however, of the compound eye has but one nerve fibre in relation with it. On the other hand, in the *Diptera* at least there is a general decussation of nerve fibres in the great optic nerve of the compound eye; those from the upper facets crossing those from the lower, and those from the

anterior crossing those from the posterior, before they enter the optic ganglia. Müller, in his classical work on the organs of sense, pointed out the fact that the eyes of Arthropods, which are adapted for seeing in the water, do not differ, in the distance of the recipient structures from the cornea, or in the relative convexity of the latter, from those which are adapted for vision in air, as they should if dioptric vision existed.

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY,

Assist.-Naturalist in the Museum, Royal Dublin Society.

No. III. NYMPHALIDÆ—DANAINÆ.

THE classification of *Lepidoptera* is confessedly exceedingly difficult, and is still far from satisfactory. Many groups are natural, and are recognized as such at a glance; but it is extremely difficult to determine the relations in which these stand to one another, and our existing arrangements can only be regarded as tentative. It would therefore be out of place to discuss the various systems in detail in a series of elementary papers, and I will only briefly mention those of the butterflies here.

Linné commenced his classification of *Lepidoptera* by arranging the largest and handsomest species at the head of each genus, without much regard to structure, and he consequently placed the swallow-tails and the great blue South American butterflies (*Morpho*, &c.) in the same group, at the head of his genus *Papilio*, although the former have six perfect legs, and the front pair of the latter are atrophied. His successors removed these species, but both Boisduval and Doubleday left the six-legged swallow-tails, forming their restricted genus, *Papilio*, at the head of the butterflies. More recently, however, Bates has re-arranged the families of butterflies according to a system adopted by several continental entomologists since the time of Linné, placing those families of butterflies in which the front legs are least developed at the head, and those which have six perfect legs next to the moths; and his system, being recognized as the most natural, is now generally adopted by English and German

entomologists; and being used, with some trifling modifications, in my 'Synonymic Catalogue of Diurnal Lepidoptera,' will also be employed here.

The first of the five great families of butterflies is that of the *Nymphalidæ*, which comprises about half the known species. It may easily be distinguished from all the others by the front legs being rudimentary in both sexes, especially in the males; and the pupa is suspended freely by the tail. The *Nymphalidæ* may be divided into the eight following families, the last of which probably requires further subdivision:—*Danainæ*, *Satyrinæ*, *Elyminiinæ*, *Morphinæ*, *Brassolinæ*, *Acræinæ*, *Heliconinæ*, and *Nymphalinæ*. In the present paper we will consider the *Danainæ* only.

The *Danainæ* have lately been extended to include all the genera formerly classed with the *Heliconinæ*, except the genus *Heliconius* itself, and consequently comprises genera of very different external appearance. The larvæ are smooth, with fleshy processes, and the submedian nervure of the fore wing of the imago is double at its origin.

The wings of the *Danainæ* are usually rounded (sometimes slightly dentated), and the hind wings are never tailed, which only occurs, in this family, in some *Nymphalinæ*, and very slightly in some *Satyrinæ*, &c.

The first genus, and the one which contains the largest species of this sub-family (averaging about five inches across the wings) is *Hestia*, which is found in the East Indies. These are butterflies of a semitransparent white, more or less clouded or spotted with black or brown, especially on the cell of the fore wings. They are said to be butterflies of very elegant appearance on the wing, from which they have sometimes been called, "spectre butterflies." They differ considerably in shape, and the wings, as in most of the butterflies of this group, are very large in comparison to the size of their bodies.

Passing over *Ideopsis*, an East Indian group resembling the last, but smaller, and in some species more like the next genus in markings, we arrive at *Danaus*, a large group found in all tropical countries. The predominating pattern is a dark ground colour, the centres of all the wings being filled up with white, yellow, greenish, or fulvous. These paler markings sometimes extend over the whole wing, and

are sometimes entirely broken up into spots. The only European species of the *Danainæ* is *Danaus Chrysippus*, a fulvous species with black borders dotted with white, and a white macular band across the black tip of the fore wings. The hind wings are marked with four black spots. There is a common African form in which the hind wings are white, with a fulvous edging within the black border. *D. Chrysippus*, like all the *Danainæ*, is well protected from enemies by the toughness of its integuments, and by its exuding a strongly-smelling fluid when handled. Most of the *Danainæ* are "mimicked" by other butterflies, but few to such an extent as *D. Chrysippus*, which is most closely represented by the females of different species of *Elymnias*, *Argynnis*, *Hypolimnas*, and *Papilio*. The *Danai* have the hind margins slightly dentated, and the costa of the fore wings slightly concave; they generally average about three inches in diameter, but the largest and one of the commonest species, the well-known North American *D. Eriippus*, measures four inches across the wings, while the smallest of the green species, *D. Pumila*, does not measure two inches in expanse. All the American species, like *D. Chrysippus*, are fulvous.

The genus *Amauris* is entirely African, and the few species it contains are black or brown insects, about three inches in expanse, with the fore wings spotted, and more or less of the base of the hind wings occupied with semitransparent white. In some species, there is a yellowish band on the hind wings, and in one the spots of the fore wings are also yellowish. These insects are "mimicked" by different species of *Papilio* and *Hypolimnas*.

The genus *Euplœa* contains a number of Asiatic species, and a few African and Australian. The wings are either longer or rounder than in *Danaus*, and are usually less distinctly denticulated. The species vary from two to four inches in expanse, and are generally of a rich dark-brown colour, often shot with blue, and more or less spotted with white or blue, especially near the margins of the wings, and on the disks of the wings beneath. Generally speaking this genus is one of the most easily recognisable of any; but it is "mimicked" not only by species of *Papilio* and *Elymnias*, but even by some *Bombyces*.

The last Old World genus of this subfamily, *Hamadryas*, contains a very few species in Amboina, Australia, &c., black,

with rounded wings, spotted with semitransparent white on the fore wings, and with the disk of the hind wings filled up with the same colour. The hind margins are spotted with white beneath. These insects do not exceed two inches in expanse, and much resemble some species of *Neptis* (*Nymphalinæ*) in appearance.

The South and Central American species of *Danainæ* are exceedingly numerous, and cannot easily be confounded with any other butterflies, except certain species of *Heliconius* and *Dismorphia*; from the latter they may be at once distinguished by their imperfect front legs, and from the former by the larger discoidal cell of the hind wings. They are generally insects with long slender bodies, and long narrow rounded wings, frequently more or less transparent. The greater part of the smaller species fall into the genus *Ithomia*; and a large number are more or less transparent, a character which, though not confined to them or to South American butterflies, is rare in other groups and in other countries. Among the more interesting of the remaining genera are *Lycorea*, black and fulvous butterflies, three or four inches across, with yellow spots on the fore wings, and a row of marginal white dots on the hind wings; *Thyridia*, nearly as large, but with narrower wings, transparent, edged and streaked with black; and "mimicked" by different moths of the families *Castniidæ* and *Pericopidæ*; *Mechanitis* and *Melinæa*, narrower and smaller insects than *Lycorea*, but similarly marked with black and fulvous, and generally also with yellow; and *Tithorea*, generally resembling *Lycorea* in pattern, and of nearly equal size (one species, *T. Bonplandii*, is rich deep black, with milky white spots on the fore wings and round all the hind margins, and a broad yellow band near the base of the hind wings).

The New World *Danainæ* are a somewhat difficult study, as the species are very numerous and closely allied. They are also very uniform in colour, the prevailing tints being black, transparent, fulvous, yellow, and white. A great number of *Ithomiæ* are figured in Hewitson's 'Exotic Butterflies'; and there is a very valuable paper by Bates on the *Heliconidæ* of the Amazon Valley (Trans. Linn. Soc., vol. xxiii., published in 1862).

Our next article will be devoted to the *Satyrinæ*.

ON THE SPIDERS OF SCOTLAND; WITH A LIST OF SPECIES.

By the Rev. O. PICKARD-CAMBRIDGE, M.A., C.M.Z.S.

(Concluded from p. 181.)

Fam. EPEIRIDES.

META, C. L. Koch = *Epëira*, Bl., *ad partem*.*Meta segmentata*, Clerck = *Epëira inclinata*, Bl., + *E. Mengii*, id. Universally distributed (O. P. C., J. W. H. T., J. H.); near Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).*M. merianæ*, Scop. = *Epëira antriada*, Bl., + *E. celata*, id. At the foot of Ben A'an (O. P. C.); Berwickshire (J. H.); everywhere (J. W. H. T.); Glasgow (H. C. Y.).*M. menardi*, Latr. = *Epëira fusca*, Bl. Near Aberdeen (J. W. H. T.); foot of Ben A'an (O. P. C.).

TETRAGNATHA, Latr.

Tetragnatha extensa, Linn. Trosachs (O. P. C.); Berwickshire (J. H.); Sutherland, and generally in Aberdeen district (J. W. H. T.).CYRTOPHORA, Sim. = *Epëira*, Bl., *ad partem*.*Cyrtophora conica*, Pallas. Inverury, Rothiemay in Banffshire (J. W. H. T.).SINGA, C. L. Koch = *Epëira*, Bl., *ad partem*.*Singa hamata*, Clerck = *Epëira tubulosa*, Bl. Near Castle Douglas (W. D. R. D.).*S. albovittata*, Westr. = *Epëira calva*, Bl. Braemar, near Aberdeen, Inverury (J. W. H. T.).*S. pygmæa*, Sund. = *Epëira anthracina*, Bl. Dunkeld (J. W. H. T.).CERCIDIA, Menge = *Epëira*, Bl., *ad partem*.*Cercidia prominens*, Westr. = *Epëira bella*, Meade. Berwickshire (J. H.).ZILLA, C. L. Koch = *Epëira*, Bl., *ad partem*.*Zilla x-notata*, Clerck = *Epëira similis*, Bl. Everywhere (O. P. C.); Glasgow (H. C. Y.).*Z. atrica*, C. L. Koch = *Epëira calophylla*, Bl. Everywhere in Aberdeen district (J. W. H. T.); Ross-shire (J. F. M.); near Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).EPEIRA, Walck. & Thor. = *Epëira*, Bl., *ad partem*.

Epëira cucurbitina, Clerck. Loch Rannoch (O. P. C.); Sutherland, Aberdeenshire, Dunkeld (J. W. H. T.); Glasgow (H. C. Y.).

E. diademata, Clerck = *Epëira diadema*, Bl. Everywhere (O. P. C.); universally distributed (J. W. H. T.); Berwickshire (J. H.); near Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).

E. scalaris, Walck. Braemar (J. W. H. T.).

E. cornuta, Clerck = *Epëira apoclista*, Bl. Foot of Ben Nevis (O. P. C.); everywhere in Aberdeen district, Sutherland, East Ross (J. W. H. T.); near Castle Douglas (W. D. R. D.).

E. quadrata, Clerck. Everywhere in Aberdeen district, Sutherland, East Ross (J. W. H. T.); Loch Rannoch (O. P. C.).

E. umbratica, Clerck. Braemar (J. W. H. T.).

E. Youngii, Cambr. Perthshire (M. Y.).

Fam. THOMISIDES.

Xysticus, C. L. Koch = *Thomisus*, Bl., *ad partem*.

Xysticus cristatus, Clerck. Everywhere in Aberdeen district (J. W. H. T.); everywhere (O. P. C.); Berwickshire (J. H.); near Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).

X. viaticus, C. L. Koch. Near Aberdeen (J. W. H. T.).

X. pini, Hahn. = *Thomisus audax*, Bl. Old Cambus by Cockburnspath (J. H.).

X. cinereus, Bl. Berwickshire (J. H.).

X. lanio, C. L. Koch. Dunkeld (J. W. H. T.); Cheviots (J. H.).

X. erraticus, Bl. Arthur's Seat (O. P. C.); Banchory (J. W. H. T.); Old Cambus by Cockburnspath (J. H.).

X. bifasciatus, C. L. Koch. Arthur's Seat (O. P. C.).

X. trux, Bl. Arthur's Seat (O. P. C.); near Aberdeen, Dunkeld (J. W. H. T.); Glasgow (J. H.).

X. atomarius, Panzer = *Thomisus versutus*, Bl. Near Aberdeen (J. W. H. T.); Berwickshire (J. H.).

X. horticola, C. L. Koch = *Thomisus pallidus*, Bl. Arthur's Seat and Pentlands (O. P. C.); Berwickshire (J. H.).

PHILODROMUS, Walck. = *Philodromus*, Bl., *ad partem*.

Philodromus aureolus, Clerck. Strathdon (J. W. H. T.).

Philodromus cespiticolis, Walck. Dunkeld (J. W. H. T.); Loch Rannoch (O. P. C.); Berwickshire (J. H.).

P. elegans, Bl. Aberdeenshire, Dunkeld, Lintrathen (J. W. H. T.).

THANATUS, *C. L. Koch* = *Philodromus*, *Bl.*, *ad partem*.

Thanatus oblongus, Walck. Berwickshire (J. H.).

Fam. LYCOSIDES.

OCYALE, *Sav.* = *Dolomedes*, *Bl.*, *ad partem*.

Ocyale mirabilis, Clerck. Keith, Blair Gowrie in Perthshire (J. W. H. T.); foot of Ben A'an (O. P. C.); near Castle Douglas (W. D. R. D.).

DOLOMEDES, *Latr.* = *Dolomedes*, *Bl.*, *ad partem*.

Dolomedes fimbriatus, Clerck and Bl., + *D. ornatus*, Bl. Loch Rannoch in 1858, by the well-known collector of insects, the late Mr. Foxcroft.

PIRATA, *Sund.* = *Lycosa*, *Bl.*, *ad partem*.

Pirata piraticus, Clerck, sub. *Lycosa*, Bl. Near Loch Katrine and Loch Rannoch (O. P. C.); Strathdon (J. W. H. T.); near Castle Douglas (W. D. R. D.).

P. Knorri, Scop. Dr. Koch tells me that he has received this spider from the Isle of Arran, where it was captured by Mr. Kyle. This is its first record as British.

P. leopardus, Sund. = *Lycosa cambrica*, Bl. Aberdeenshire (J. W. H. T.); near Castle Douglas (W. D. R. D.).

TROCHOSA, *C. L. Koch* = *Lycosa*, *Bl.*, *ad partem*.

Trochosa biunguiculata, Cambr. Braemar (J. W. H. T.).

T. cinerea = *Lycosa allodroma*, Bl. Dunkeld, Stanley near Perth, Banchory near Aberdeen (J. W. H. T.).

T. picta, Hahn. Common on the coast (J. W. H. T.); Berwickshire (J. H.).

T. ruricola, De Geer = *Lycosa campestris*, Bl. Perth, Keith in Banffshire (J. W. H. T.); near Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).

T. terricola, Thor. = *Lycosa agretica*, Bl. Arthur's Seat (O. P. C.); Dunkeld (J. W. H. T.); Old Cambus (J. H.); near Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.); Berwickshire (J. H.).

LYCOSA, *Latr.* = *Lycosa*, *Bl.*, *ad partem*.

Lycosa annulata, Clerck = *L. saccata*, Bl. Aberdeenshire (J. W. H. T.); everywhere in dry water-courses,

probably mixed up with the next species (O. P. C.); Berwickshire (J. H.); near Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).

Lycosa agricola, Thor. = *L. fluviatilis*, Bl. Shores of Loch Rannoch (O. P. C.); Aberdeen (J. W. H. T.).

L. Traillii, Cambr. Braemar (J. W. H. T.).

L. lugubris, Walck. Foot of Ben A'an (O. P. C.).

L. pullata, Clerck = *Lycosa obscura*, Bl. Cheviots (J. H.); Ben A'an, Ben Nevis, &c. (O. P. C.); Strathdon in Aberdeenshire (J. W. H. T.); near Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).

L. nigriceps, Thor. = *L. congener*, Cambr. Near Aberdeen (J. W. H. T.); near Castle Douglas (W. D. R. D.).

L. palustris, Linn. = *L. exigua*, Bl. Berwickshire (J. H.); generally distributed, but probably confused with the next species (O. P. C.); near Castle Douglas (W. D. R. D.).

L. monticola, Clerck. Aberdeen, Dunkeld, Lintrathen in Forfarshire, near Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).

TARENTULA, Sund. = *Lycosa*, Bl., *ad partem*.

Tarentula pulverulenta, Clerck = *Lycosa rapax*, Bl. Ben A'an, Ben Nevis, Schiehallion, &c. (O. P. C.); Glasgow (H. C. Y.); Aberdeen (J. W. H. T.); Berwickshire (J. H.); near Castle Douglas (W. D. R. D.).

T. aculeata, Clerck. Braemar (J. W. H. T.); not before recorded as British, but hitherto confused with the preceding species. Dr. L. Koch has also received this species from the Isle of Arran, captured by Mr. Kyle.

T. andrenivora, Walck. Ben A'an (O. P. C.); Perth, Keith, Aberdeen (J. W. H. T.); Glasgow (H. C. Y.).

Fam. SALTICIDES.

EPIBLEMUM, Hentz. = *Salticus*, Bl., *ad partem*.

Epiblemum scenicum, Clerck (= *S. scenicus*, Bl., *ad partem*). Strathdon, Banchory, Dunkeld (J. W. H. T.); Arthur's Seat, &c. (O. P. C.); Berwickshire (J. H.).

HELIOPHANUS, C. L. Koch = *Salticus*, Bl., *ad partem*.

Heliophanus cupreus, Walck. Dunkeld, and Muchalls near Aberdeen (J. W. H. T.).

EUOPHRYS, C. L. Koch = *Salticus*, Bl., *ad partem*.

Euophrys reticulatus, Bl. Arthur's Seat (O. P. C.).

Euophrys æquipes, Cambr. Paisley (M. Y.).

E. frontalis, Walck. Aberdeen (J. W. H. T.); Old Cambus (J. H.).

ATTUS, Walck. = *Salticus*, Bl., *ad partem*.

Attus falcatus, Clerck = *Salticus coronatus*, Bl. Dunkeld (J. W. H. T.); Berwickshire (J. H.).

A. erraticus, Walck. = *Salticus distinctus*, Bl. Paisley (M. Y.).

SALTICUS, Latr. = *Salticus*, Bl., *ad partem*.

Salticus formicarius, Walck. Scotland (Dr. Leach, Encyclop. Britt. Suppl. to 4th, 5th, and 6th Ed., Art. *Annulosa*). Dr. Leach gives no locality nor description. I am inclined to think, however, that his record is trustworthy.

PS.—Since the above list was drawn up, Dr. L. Koch, of Nuremberg, has informed me of two species received by him from Arran, and not hitherto recorded as British,—*Pirata Knorri*, Scop., and *Tarentula aculeata*, Clk. These, now inserted in their place, *supra*, raise the total of known Scotch spiders to 215.

Bloxworth, Dorsetshire.

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR's 'Die Mitteleuropäischen Eichengallen.'

By EDWARD A. FITCH.

(Continued from p. 173.)

70. *Spathegaster baccarum*, L. (= *S. interruptor*, H.).—This, the commonest of the berry galls, which, shortly after the appearance of the leaves of *Quercus sessiliflora*, *Q. pedunculata*, and *Q. pubescens*, occurs on their under side, as well as on the catkins, in May, is very sappy, green (catkin specimens more or less red), translucent, spherical, hairless, and as big as a pea; it is so contexturate with the leaf that a more or less convex, sharply defined, circular disk, with a small boss in the middle, is apparent on its upper surface. This disk has a diameter of 3·5—6 millimetres; it is only in a rare case, when the gall occurs on the midrib, that it does not grow through the leaf, and in the catkins it occurs on the flower-stalk. In section the gall exhibits a very sappy, soft parenchyma, which is hollowed out in the centre as a larva

cell. The galls occurring on *Q. pubescens* are covered with short, scattered, both simple and branched, hairs, of about 0·3 millimetre in length, so that they greatly resemble the following species. In the second fortnight of May, sometimes



Fig. 70.—SPATHEGASTER BACCARUM.

the beginning of June, the flies bite through the galls, whereupon they become completely shrivelled in a few days; only such galls as are inhabited by inquilines retain their shape; and often dry, brownish yellow, but still perfectly spherical, galls may be found in autumn, which always contain a *Pteromaloid* larva or pupa. From Herr Forel I obtained the galls of this species from the Vosges and from the Lake of Geneva.—G. L. MAYR.

It is this species which is the cause of the well-known currant galls of the oak; and here we have a slight departure from the general uniformity of gall species: those of *S. baccarum* differ somewhat from the circumstance of their situation, and become divisible into two varieties, though both are structurally constant: these are (1) the true currant gall, Linné's *Quercus pedunculi*, occurring on the stamiferous flowers; and (2) the berry gall, Linné's *Quercus baccarum*, occurring on the leaf. Both varieties occur together; they are very common, generally distributed, and conspicuous either on the young leaves or catkins in the first fortnight of May in the South of England, June, in North Britain. Like other abundant galls its increase is much

limited through parasitism. Dr. Mayr has established seven species amongst the *Synergi* and *Torymidæ* alone, viz.:—*Synergus albipes*, H., *S. facialis*, H., *S. radiatus*, Mayr, *Callimome abdominalis*, Boh., *C. incertus*, Först., *C. regius*, Nees, and *C. auratus*, Fonsc. These all appear on the wing at about the same time as, or a little later than, the *Spathegaster*. There is a fact of some interest (as pointed out by Mayr) noticeable in the parasitism of *C. incertus*, as he received specimens, which he was unable to separate, as follows:—seven bred from *Bathyaspiis aceris*, three from *S. baccarum*, four from *S. nervosa*, and seventeen from *Cecidomyia circinans* galls. Now if these thirty-one specimens were specifically equal, their inhabiting both oak and maple galls is certainly aberrant; and, further, one of the oak species is dipterous. Respecting *C. auratus* (= *approinquans*, Ratz.), Mayr says:—"In one well-authenticated case I have found the larva of this species sucking a pupa of *S. baccarum*." I have myself seen this on many occasions, and succeeded in breeding the *Callimome* from the opened gall some six or seven times. This is by far the commonest parasitic inmate of these galls in Britain; it appears about a fortnight later than the gall-maker; both are very readily bred, owing to the rapidity of their metamorphosis—a striking contrast to *Neuroterus*. There is an opinion prevalent amongst American entomologists that many, if not all, oak *Cynipidæ* are double-brooded, and that the two broods produce galls distinct from one another. Although I cannot think that this holds amongst European species, there is a link wanting in the life-history of this gall now under notice. It is at present only known for about one month out of the twelve: *e.g.*, in 1872, for which year I have the fullest record, I noticed no gall before the 6th May, and the last *Spathegaster* bred, out of some hundreds, emerged on 3rd June; possibly three weeks would be an average for the time elapsing between the first noticeable appearance of the gall and the emergence of its maker. Now the question is what is its state during the eleven months from June to May? The imagos are certainly short lived, and I think it may be doubted whether the next year's buds are sufficiently matured to receive the egg, laid as it is in both fruit and leaf gems. The close observation of any catkin-gall producing species

might settle the question. Mr. Bassett, with the assistance of Mr. Riley, has bred *C. operator*, O. S., from the woolly bud galls of the shrub oak (*Quercus ilicifolia*), and from the acorn-cup galls on the same tree. Should the flies bred from these two galls be specifically identical, of which, however, I think there is great doubt, it would revolutionise many ideas of gall-history as now understood; one of general application being, as mentioned above, the constancy of the production. For further information on the double-brooded theory Mr. Bassett's paper must be consulted (Can. Ent. v. 91); it is shortly to be enlarged upon, giving the results of four years' further observation. To return to the question of parasitism:—In addition to the *Synergi* and *Torymidæ* we have a *Eurytoma* and *Pteromalus*: the former is bred much more frequently than the latter; however, both occur later than the other inmates, the *Eurytoma* generally appearing to the end of July. *Zeiraphera communana* was bred from this gall by Mr. C. G. Barrett: this is a *Tortrix* which frequently lives in the common oak-apple (see Entom. ix. 40).

This season two or three valued correspondents, as well as myself, have endeavoured to throw further light on the life-history of this species, but with very limited, if any, success; one fact noticed has been its relative scarceness this year. However, Dr. Adler, of Schleswig, is said to have "proved" the metagenesis theory to hold in *Cynipidæ*; but I prefer to leave the above as written some time since, and wait for further information on so important a discovery. If *Neuroterus lenticularis* is but a "forme transitoire" of *Spathegaster baccarum*, it surely should not be difficult of direct proof. From a life-history point of view, as at present followed out, it certainly is possible.—E. A. FITCH.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

ADDITIONAL NOTES ON *COLIAS EDUSA*.—Below are further records of the abnormal occurrence of *Colias Edusa* during last June in the following additional localities:—

SUFFOLK.—Many specimens near Ipswich; H. Miller, jun.

MIDDLESEX.—Upwards of thirty, many in splendid condition; W. J. Vandeburgh.

HEREFORDSHIRE.—A great many seen; P. T. Horne.

NORTHUMBERLAND.—Many seen on banks of Tyne and its tributaries, also on the coast, chiefly from 20th to end of June; W. Maling.

DURHAM.—June 3rd to 14th quite commonly; A. Mitchel. "I know now of scores seen or taken in this county, while I question if half a dozen autumnal stragglers have been taken during the last twenty years. I have a letter to-day, from Berwickshire, from a collector who has taken ten, including a pair in cop.; John E. Robson."

ROXBURGHSHIRE.—One very fine specimen, June 17th, at Jedburgh; A. Elliott.

Two errors inadvertently occurred in the list of localities published last month. Mr. H. Goss' captures were in Ashdown Forest and East Grinstead, on June 8th; and between Cheesington and Leatherhead, June 9th. Mr. Reeks points out that Thruxton is in Hampshire, and not in Norfolk as printed: he adds,—“On June 19th I took a beautifully fresh pair of *Colias Edusa* in cop., which will, I think, prove they had not hibernated.”—JOHN T. CARRINGTON.

COLIAS EDUSA BRED.—June 6th, female captured; 8th, eggs laid on *Medicago lupulina*; 14th, eggs hatched. July 7th (afternoon), two larvæ fixed for changing; 9th (morning), two perfect pupæ; 21st (12 to 1 p.m.), two males emerged. I distributed some seventy or eighty eggs, and have now seventeen larvæ, ninety-three pupæ, and have bred two imagos; but owing to the roaming habits of the larvæ in finding some convenient ledge on which to pupate, several were lost. The larvæ were fed almost exclusively on lucerne (*Medicago sativa*) and white clover (*Trifolium repens*). This is, I believe, the first instance of *Colias Edusa* being reared in this country.—EDWARD A. FITCH; Maldon, July 21, 1877.

SPHINX PINASTRI IN SUFFOLK.—A fine specimen of this almost doubted British species was captured about a month since at Tuddenham, near Ipswich, by the Rev. John Longe. It was at rest on a tree trunk when discovered, and in close proximity to honeysuckle in blossom.—H. MILLER, Jun.; Ipswich, July 19, 1877.

SPHINX PINASTRI.—I send you a drawing of *Sphinx pinastri*, bred by me from a pupa found near here, but when

I cannot remember. It emerged August 5, 1876.—[Rev.] E. H. FRERE; Horham Rectory, Wickham Market, Suffolk.

[The drawing sent by the Rev. E. Hanbury Frere is a well executed sketch of *Sphinx pinastri*.—ED.]

CIDARIA RETICULATA BRED.—I have at last succeeded in rearing a gorgeous specimen of this insect from a larva I obtained last autumn. This is, I believe, the first time that it has been bred in this country. I had almost given up all hopes of success after the many long journeys I have had to obtain the larva.—J. B. HODGKINSON; Preston, July, 1877.

RARE LEPIDOPTERA IN CAMBRIDGESHIRE FENS.—While collecting *Lepidoptera* in the Cambridgeshire fens, during June last, I captured a perfect male *Hydrilla palustris*, and two specimens of *Bankia argentula*. I also took a fine series of *Macrogaster arundinis*, *Meliana flammea*, and of *Nascia ciliaris*. I have also bred *Gelechia morosa* from larvæ collected there.—A. B. FARN; Dartford, July 10, 1877.

HYDRILLA PALUSTRIS AT WICKEN FEN.—At about 12.30 a.m. on the 12th June, when leaving Wicken Fen after a night's collecting, a *Noctua* not familiar to me crawled up the glass of my lantern whilst it was resting on the ground; it proved, on examination when I reached home, to be a male specimen of *Hydrilla palustris* in fair condition.—A. H. JONES; Shrublands, Eltham, July 7, 1877.

HELIOTHIS SCUTOSA.—In common, I have no doubt, with many of your readers, I have read with much interest the paper, in the 'Entomologist' for May, by Mr. E. A. Fitch, noticing the occurrence in the South of England of two specimens of *Heliothis scutosa*, and referring to those taken in Cumberland between forty and fifty years ago. As it seems probable this rare species will now take its place permanently in British lists, it seems only reasonable that whatever credit may attach to the first discovery should be distinctly awarded where it is due. I thought some one better qualified would have taken up the subject in the 'Entomologist;' but as this has not been done I give below what I believe will be found to be the correct account of the capture of the Cumberland specimens. The first known British specimen of *H. scutosa* was taken in July, 1833, near Dalston, a village in the immediate neighbourhood of Carlisle, by Mr. James Cooper, then and for some years

subsequently resident in that city, and now living near Warrington. He carried it alive to the late Mr. T. C. Heysham, of Carlisle, who some time after forwarded it to Mr. Curtis, who described and figured it in his work on 'British Entomology.' The other, and next in order of date, was the capture by Mr. Rothwell, near Skinburness on the Solway, in August, 1834, as mentioned by Mr. Heysham in the memorandum sent along with his specimen to Mr. Curtis. With respect to the food of the larvæ I have reason to believe that *Artemisia campestris*, usually assigned as the food-plant of this species, does not grow in the county. There is, however, little doubt they would feed on other plants of the genus. *A. vulgaris* is found in many parts of the district, and *A. maritima* occurs rather sparingly along the coast; but neither could be described as plentiful. It is most probable the plant at which Mr. Rothwell made his capture was the ragwort (*Senecio Jacobæa*), which in some districts of the county is called "muggert" or "mugwort." It is very abundant near the coast, and its large heads of golden yellow flowers prove very attractive to many insects, and are visited, especially at night, by large numbers both of *Noctuæ* and *Geometræ*.—J. W. HARRIS; Derwent Bank, Broughton, *viâ* Carlisle.

EPHESTIA ELUTELLA, A DESTRUCTIVE INSECT.—During the autumn of last year (1876) a large quantity of chicory was stored in a warehouse in this city: the room was filled to within a foot of the ceiling. This was not examined until about two months ago, when, to the amazement of the owner, the entire ceiling and walls were covered with a fine web-like material, in texture not unlike very thin and fine kid-leather. The top of the chicory was also covered with webs or galleries, in which were feeding thousands of lepidopterous larvæ. A portion of the web was removed from the ceiling in one piece, not less in size than ten feet long by five wide. This was exhibited at our Naturalists' Field Club meeting as a great curiosity. At the time of exhibition I gave my opinion that these larvæ were most probably those of *Ephestia elutella*, from the fact that I had some larvæ of that species in a tin box feeding on currants, and also some in a wooden box feeding on currants and aniseseed mixed. Above the food in both boxes was a web of similar texture to the one exhibited.

I therefore concluded the larvæ I had were either *E. elutella* or *Plodia interpunctella*. The larvæ answered much better to Stainton's description of the latter insect than to the former; therefore I was much in doubt. However, the question has been set at rest; and the insect proves to be *Ephestia elutella*, for I have bred one from the mixed food, and also one from currants; Mr. Smith, of this city, one of the members of our club, the gentleman who exhibited the sheet of web, has also bred two specimens from chicory: and all prove to be *E. elutella*. The great destruction of chicory caused by the larvæ of this insect proves what a pest it may become if not kept in check. On making enquiry at the warehouse infected I found that some years ago the owners had some foreign chicory, and were very much annoyed with moths the following season; so they had the room stoved, and had not noticed any until last season, when a few were observed, but nothing was done to destroy them, the owner having no idea they would in time prove so destructive. The larvæ feed a long time, for I have had some six months, and they are only now just going into pupæ, but they do not seem to have grown at all during the last four months.—W. PREST; Holgate Road, York, June 8, 1877.

THE "FLY" AND YOUNG CLOVER.—In this county great has been the outcry about the young clover plant—which this year in most localities, under favourable conditions, came up thicker than perhaps was ever remembered—being taken by the "fly." Hundreds of acres I hear are completely eaten off, and the plant consequently destroyed, as there is no chance of young clover coming again, thus differing from corn plant, which is sometimes renovated in an extraordinary degree after the attacks of slug or wireworm. Red clover (*Trifolium pratense*), to which this note principally refers, is sown amongst the corn in the spring for the succeeding year's crop; and every farmer knows the importance of his plant standing. To estimate the damage accruing to the loss of plant would be difficult; but it may be stated that the cost of seed and sowing is generally valued at from ten to twelve shillings per acre. It is useless to fight against an unknown enemy; and the two great insect enemies to clover plant are unknown, though by no means unfelt: these are what is commonly talked of by agriculturists as (1) the "fly" and (2)

"the white maggot," which feeds at the roots, and by separating the crown is the cause of much loss of plant in the second spring. I have had many specimens of this coleopterous larva, but never succeeded in rearing it. With regard to the former, a gentleman, who has more entomological knowledge than the average of agriculturists, in so much that he knows the "turnip fly" to be a beetle, assures me the "clover fly" is the same insect; whether it be the *Haltica* I think is very doubtful, but this is circumstantial evidence that the little depredator is coleopterous: it may possibly be *Sitones*. Although I have forty-nine acres of red clover, all of which is more or less affected, after repeated search—in sunshine, in dull weather, and by night—I have quite failed to find a single *Haltica*, weevil, or whatever the "fly" may be. A small slug occurs in plenty, and I must think these have done the whole damage in my case: it is well known they assist at all times, more or less according to seasons. I hope this note may lead to the identification of this little unknown. Last Monday, when out driving, I noticed what was to me an unknown agricultural implement at work in a field of barley, and found it consisted of some coarse sacking (old guano bags) stretched over a frame, and trailing loose behind; the frame running on two wheels was being driven up and down the field "to brush the fly off the young clover." Whether "Pertwee's patent" stayed the plague, I know not. However, it was decidedly a move in the right direction, an attempt to cope with insect attack. I hear from one source that the young lucerne has suffered in like manner with the clover.—EDWARD A. FITCH; Maldon, Essex, June 6, 1877.

CAPTURES AT EPPING.—Amongst my captures in Epping Forest this season I may note the larvæ of *Pyrameis cardui* in great profusion: they may now be found in some districts on almost every thistle plant. During the first week in June the pretty little *Erastria venustula* was not infrequent; while during the early part of this July *Limacodes asellus*, *Stigmonota interruptana*, and *Chrosis Audouinana* were taken.—T. EEDLE; 40, Goldsmith Row, Hackney Road, E., July, 1877.

PYRRHOCORIS APTERUS.—In answer to Dr. Buchanan White, as to what my reasons are for supposing *Pyrrhocoris apterus* had exterminated the ants from the rock off Teignmouth, I

thought, at the time I wrote, it would have been strange if ants had not been on it at the time of separation from the main land, and seeing the great number there are on a rock not far from it, I jumped to the conclusion that *P. apterus* had exterminated them—although by what means I could not exactly see.—F. BEYNON; Torquay, June 4, 1877.

MEETINGS OF SOCIETIES.

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.

THE ordinary monthly meeting of this Society was held in the Small Lecture Hall, Borough Museum, Liverpool, on the 30th ult. The President in the chair. Mr. Nicholas Cooke, the vice-president, read the following remarks respecting the discovery and distribution of *Nyssia zonaria*:—

“In the ‘Entomological Magazine’ (ii. 437), for the year 1834, the following notice of the capture of *N. zonaria*, written by the late Edward Newman, appeared:—

“‘This beautiful and remarkable addition having been made to our British *Lepidoptera*, and Mr. Eveleigh, the President of the Banksian Society of Manchester, supposing it to have been an entirely new species, having most kindly brought to town three specimens purposely for description in this Magazine, among my ‘Entomological Notes,’ I immediately submitted them to the notice of Mr. Stephens, who had never seen anything like them before.

“‘I then applied to Mr. Children, whose entomological library I knew to be unrivalled in this country, and who with the most prompt kindness, informed me the insect was *Zonaria*, both of Hübner and Duponchel.

“‘A single specimen of the male was taken on the rushes about half a mile below Black-rock, near Liverpool, in September, 1832; and about the middle of the same month, in the following year, from twelve to twenty specimens of the same insect—both males and females—were taken in the same locality.

“‘The captor is Mr. Nicholas Cooke, of Liverpool.

“‘The following is the description of the insect:—The female apterous with seven rings on the body; the zone is,

as nearly as may be, that of *N. hispidaria*. I shall be glad to show the specimens to any entomologist who may wish to see them.—EDWARD NEWMAN.'

"As it is well known to every one who has been in the habit of taking this insect that it could not appear in September, it may be interesting to state the facts relating to the capture, the second of which I have just read.

"In September, 1832, my brother Benjamin found a pupa of this species in the sand on the Cheshire coast, which proved to be a female; but the imago did not appear till after I had captured a number of the perfect insects during the February of 1833, and which I took to the late Joseph Eveleigh, of Manchester.

"Many years since I was collecting insects on the Cheshire Sandhills, in company with James Cooper, of Warrington, when we found a number of larvæ, which I told him were those of *Zonaria*; and I remember him remarking that he had found the same larvæ in the North.

"I lately wrote to him for the particulars of his capture, and he sent me the following reply:—'When I came to Preston from Carlisle, or shortly after, I was engaged by the Preston Literary and Philosophical Society, and sent out to the Hebrides to collect birds, about the year 1844. It was when so engaged that I found the larva of *Zonaria* on the Island of Bernera. The few larvæ I found I put into a small box, and bred a female, but did not know what it was till next year when I found plenty near Lytham, and bred both males and females from these.'

"It is remarkable that nearly all the collections of *Lepidoptera* in this kingdom have been supplied with this species from the Cheshire coast, although I have little doubt, if properly looked for in suitable places, it might be found all round our coast; I have a strong impression on my mind that it has been captured on the south side of the Dee, and again near Llandudno. Bernera is the extreme north-west point of Scotland, and a small island, so that it probably exists along the west coast for several hundred miles;—and why not on the east and south coasts? How the apterous female gets across the rivers I do not know, but its existence on a small island is, I think, a good proof that that island has once formed part of the main land."

THE ENTOMOLOGIST.

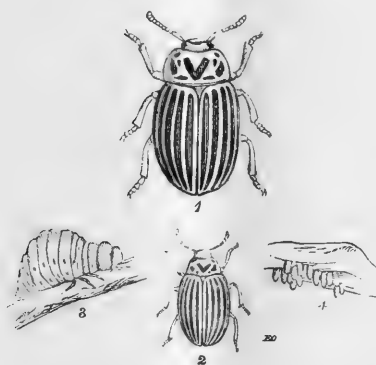
Vol. X.]

SEPTEMBER, 1877.

[No. 172.

THE COLORADO BEETLE.

By E. A. ORMEROD.



DORYOPHORA DECIMLINEATA (COLORADO BEETLE).

THE Colorado beetle is come. Slowly, but steadily, it accomplished its journey of fifteen hundred miles in about eighteen years. From Nebraska and Iowa it came on till, in 1865, it was in Missouri, and had crossed the Mississippi; passing through Indiana and Ohio, in 1870, it reached the borders of Canada and New York; and in 1871, floating along Lake Erie on sticks or leaves, it established itself in the neighbourhood of Niagara. Last year it was reported in such vast numbers on the eastern coast of America as to poison the air by the quantities in which it was thrown up on the shore in Connecticut; it was noticed on vessels out at sea; and in the autumn a specimen of the allied species (the *Doryophora juncta*, of the Confederate States) was found in

Germany. This year the much-feared pest made its first European appearance towards the end of June in a potato field near Cologne; and during the present month it has appeared in Liverpool. It is here at last; and it is a matter of national importance to meet it promptly and effectually.

This year it will probably do little harm: the crops are mostly fully grown, and some already stored; but the habit of the beetle to hibernate twelve or eighteen inches below the surface of the ground secures it from changes of temperature; and when next year's warmth, at the end of April, is bringing up the potatoes is the time when the beetle may be looked for to come up also, and begin its ravages. It is a foe of no ordinary strength; its powers of flight help to disperse it widely. As we have seen, near Cologne, burning the infested crop is no security against pupæ buried too deeply to suffer from the heat; and in its American journey it has shown that the colder rather than the hotter climate is suited to it. Where in possession of a field, a few days suffice for the destruction of the potato leaves; and, once started, the successive broods recur through the warm season at an interval of only about six weeks from the laying of the egg to the development of the perfect beetle ready to lay again. The eggs (fig. 4) are laid on the young shoots, or on the under side of the potato leaf, and hatch in about a week. The larvæ (orange-coloured grubs, fig. 3) are full fed in about a fortnight, when they go down into the ground, and changing there into pupæ reappear as developed beetles in another fortnight.

The beetle itself, *Doryophora decemlineata* (fig. 2, and fig. 1 magnified), is about half an inch long, broadly oval in shape, and easily distinguishable by its orange colour, with ten black stripes, five on each wing-case. The female lays from seven hundred to a thousand eggs at one time, and three or more broods may be produced each season. In their own country they may be seen in the invaded districts literally everywhere: on roads and fences, in the houses and the carriages, in every cranny they can get into; and the sum total of injury to crops attacked is simply utter ruin. At present we have only to do with stragglers; and it is of the greatest importance to spread a knowledge of their appearance over the country as rapidly as possible, that none of these may escape; everyone that is found should be destroyed at

once. If let go free that one beetle may be just the starting-point of a countless horde. They are easily distinguishable by their ten black stripes and orange colour; and all such beetles should be destroyed.

Presently—next season, it is to be feared, if not the present one—the eggs should be looked for on the young shoots and beneath the potato leaves, and all that are accessible, as well as the orange larvæ, should be picked off and destroyed at once; but on a large scale all are not accessible, and then is the time to be prepared with the only application which hitherto has been found thoroughly to keep the larvæ in check. This dressing, which is simply a solution of Paris green (arsenite of copper) sprinkled over the infested plants, is easy of application; the proportion used is three tablespoonfuls of green mixed with half a bucket of water first, and run through a funnel-shaped strainer into about two more bucketfuls of water. This quantity is put into a tin can, with two india-rubber tubes at the bottom, each with a rose at the end, and a simple lever apparatus inside shuts off the supply when wished. With this tin can—of which the details are given more fully in agricultural reports—fastened on his back, one labourer can sprinkle five to eight acres a day; and no evil results have been found to follow from the arsenic. A pound, or somewhat more, is sufficient for one acre; and the only precaution requisite seems keeping the tin specially for that purpose, and insisting on care with regard to the green that might be left about or adhering to the labourer. As a dangerous poison, it requires great attention in the using; but it appears in no way to make the potatoes prejudicial to health, and to be a certain means of keeping the larvæ in check.

Whilst the present excitement lasts, the *Doryophora* is not likely to make good its settlement generally; but the great danger lies in the neglected nooks to which its wings may convey it, but to which a knowledge of its appearance and destructive powers will not so soon penetrate. There, as with many of our destructive insects, will be the places from which, once established, it will reappear perpetually; and the entomologist who will spread the requisite knowledge of its appearance, and the means of prevention, in his own district, will be doing most important service, and carrying

out the request from Government that each one would aid in stamping out the new comer, or diminishing its ravages.

We cannot hope to escape it. As at first it transferred itself from the *Solanum hirsutum* to our own potato, and on its journey has strayed again to other vegetables, we may hope that the attack will not be concentrated on one crop; but though to all appearance the beetle is coming, as with reasonable care it has been kept down in Canada and the States, so it may be, if we will follow the same plan, here.

As yet few of us are acquainted with the habits of the *Doryophora* from personal observation; but we have reliable information from many sources, and amongst these the reports of Prof. Riley, Mr. A. Murray, and the Canadian Minister of Agriculture, from which I have taken some detail of the life-history and remedy.

In the illustration I have also benefitted by the specimens placed by Mr. Murray, at Kew, and at the Bethnal Green Museum.

Spring Grove, near Isleworth,
August 16, 1877.

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY,

Assist.-Naturalist in the Museum, Royal Dublin Society.

No. IV. NYMPHALIDÆ—SATYRINÆ.

PART I.

THE *Satyrinæ* are a group not remarkable for size and beauty, but are especially interesting to European Lepidopterists, because they are so well represented in this part of the globe, nearly a third of the European butterflies being *Satyrinæ*. They are usually small or middle-sized butterflies, of dark colours, with rounded wings (sometimes more or less dentated, and occasionally ending in a short tail), and are nearly always ornamented with ocellated spots. They cannot well be confounded with any other butterflies: the perfectly-closed hind-wing cells and the presence of ocellated spots on the wings will suffice to separate them from any group except the *Brassolinæ*; but these are large and robust insects, with a family likeness of their own, which would

prevent their being confounded with the smaller and much more delicately formed *Satyrinæ*. The larvæ are spineless, with a bifid tail; and those of the European species mostly feed on grasses.

The first two genera, *Cithærias* and *Hætera*, are about two inches and a half across the wings, and have short, broad fore wings, almost perfectly transparent except the fringes and nervures, and sometimes one or two narrow transverse brown stripes. The hind wings are transparent, tinged with red, purplish, or yellow, or marked with black along the hind margin, and with a blue or black eye containing a white pupil, and encircled with yellow at the front angle, and sometimes also at the anal angle. The next genus, *Pierella*, is brown, often semitransparent, with transverse lines across, most conspicuous beneath, and with a marginal row of black eyes with white pupils, often represented by dots below, one or two of which, placed at the front angle of the wing, are the most conspicuous. The hind wings are usually more or less red, yellow, black, blue, or white, towards the outer margins: one species (*P. Hortona*) is black, with the centre of the hind wings and a stripe on the fore wings blue. The next genus, *Antirrhæa*, is larger, some species measuring four inches across. They are brown, with large blue spots, sometimes on the fore wings and sometimes on the hind wings; one species (*A. Miltiades*) has a large irregular cream-coloured spot on the hind wings, instead of blue. The hind wings in several species are much dentated, and often produced into a short tail.

We now come to one of the most remarkable species in the family, *Cærous Chorinæus*. It is brown, about four or five inches across, the fore wings are strongly hooked and crossed by a broad tawny band, and the hind wings are bordered by a row of almost confluent darker tawny spots. The hind wings are almost square, the hind margin somewhat convex; but at the outer angle is a short tail placed almost at right angles to the hind margin, beneath which the wing runs almost straight to the anal angle.

This insect, like all we have yet mentioned, is South American; but the genera *Zophoessa*, *Lethe*, *Blanaida*,*

* In the forthcoming Supplement to my 'Catalogue of Diurnal Lepidoptera,' I have substituted this name for *Neope* and *Enope*, both being preoccupied.

Ptychandra, *Gnophodes*, and *Melanitis*, are Indian or African. They are insects measuring two to three and a half inches in expanse, and the hind wings are generally strongly dentated, and often prolonged into a short tail. *Zophoessa* contains brown species, with a submarginal row of black spots on the hind wings, ocellated beneath. The species of *Lethe* are also brown, and have usually a more or less well-marked white stripe across the apex of the fore wings. *Blanida* resembles *Satyrus* (*Lasiommata*) in colour, being brown, spotted or marked with tawny, but may be distinguished by its larger size and more dentated hind wings. *Ptychandra* is of a rich purplish blue, a colour not common in the *Satyrinæ*, but is marked beneath with submarginal eyes in an unmistakably Satyrine manner. *Gnophodes* contains a few brown insects, with a transverse yellow stripe across the fore wings near the tip, and is confined to Africa. In both *Gnophodes* and *Melanitis* the fore wings are hooked, and the hind wings strongly dentated. *Melanitis Leda* is an abundant insect in Asia and Africa; it is brown, with a very large black spot near the tip of the fore wings, with a white pupil, and another white spot above it. The hind wings have one or two minute spots near the anal angle. The apical markings of the fore wings are often partly surrounded with fulvous, or the fore wings may be considerably suffused with this colour. The under side varies excessively, scarcely two specimens being alike; it is generally mottled or striped with brown, sometimes with large and distinct submarginal ocelli, and sometimes with these reduced to white dots. This insect shuns the direct rays of the sun, and is generally found flying in shady places, or at dusk.

Several of the succeeding genera are among the most remarkable in the subfamily. *Orinoma Damaris*, a Himalayan butterfly, about two and a half to three inches across, resembles the genus *Danaus* in pattern. It is brown, with yellowish spots and stripes, and has a triangular orange spot at the base of the fore wings, upon which are two or three black dots. The East Indian genera *Zethera* and *Neorina* contain large species, from three to four and a half inches in diameter. *Zethera Pimplea* hardly resembles the *Satyrinæ*, being brown, with a broad transverse white band across all the wings, and the edges spotted with white. *Z. Musa* is

brown, with a broad greenish white band on the front half of the hind wings, and with yellow spots below this and on the hind margins. The species of *Neorina* are brown, and each has a large black spot with a minute white pupil, and one or more larger white spots above and below, near the tip of the fore wings. *N. Hilda* has a transverse yellow band across the fore wings, extending to the tip of the hind wings, and large black eyes with white pupils and yellow rings at the tip of both fore and hind wings beneath. The other two species have short tails. *N. Crishna* is marked like *N. Hilda* with yellowish white; and *N. Lowii* has a large blotch of the same colour at the apex of the hind wings, adjoining a smaller one at the anal angle of the fore wings. *Anadebis Himachala* is a North Indian butterfly, three inches across, marked above and below with submarginal black eyes, pupilled with white, and surrounded with clay-colour. *Oressinoma Typhla* is a delicate South American butterfly, measuring about two inches across the wings; it is brown on the hind margins and smoky towards the bases, the intermediate space being white; the hind margins beneath are marked with an inner white and outer yellow line, both of which are much indented on the hind wings.

Most of the smaller American *Satyrinæ* belong to the genus *Euptychia*, which now contains over one hundred and fifty species. They vary from one to two inches in expanse, and are usually brown, though occasionally wholly or partly white or blue; their hind margins are marked with a variable number of eyes, especially beneath, an eye at the tip of the fore wings, and those at the tip and anal angle of the hind wings being generally the most conspicuous; on the under side there are generally two brown transverse lines towards the base. *Ragadia Crisia*, from the East Indian islands, is remarkable for the brilliancy of the silver centres of the marginal eyes on all the wings beneath. It is an obscure, dull tawny insect, about two inches across, with darker transverse stripes, broader and more numerous than in *Euptychia*; the markings of the upper side are merely those of the lower surface, seen through. The genus *Maniola* or *Erebia* (from which the South African species have been separated under the new generic names of *Leptoneura* and *Pseudonympha*) is too well known to need extended notice.

The species are nearly all mountain insects, and are found throughout the Palæarctic region (North Africa excepted), in South Africa, and in Arctic and Western America. The Himalayan species have been separated as *Callerebia*: the fore wings are more rounded, and the inner margin of hind wings is considerably concave; at the tip of the fore wings is a large black eye, bipupilled with white, in a yellow ring, and a smaller one with one pupil at the anal angle of the hind wings; beneath, the hind wings are clouded with gray, and have two small eyes at the anal angle.

The next genus, *Æneis*, may be known from any other European genus by the veins of the wings being very slightly dilated. The species are tawny, with black marginal dots, the under side of the hind wings being varied with gray. Most of them inhabit the Arctic regions; but one species is found in the Alps, another on the steppes of South Russia, another in the Himalayas, and several (these latter being the largest in the genus) in the mountains of California. They vary from one and a half to two and a half inches in expanse.

A closely allied insect is the extraordinary *Argyrophorus Argenteus* of Chili, which is uniform bluish silvery above, a coloration almost unique among the *Lepidoptera*. It measures about two inches across the wings.

The genus *Melanargia* contains but few species, and is exclusively Palæarctic. All the species have an unmistakable resemblance to our own marbled white.

This is followed by *Satyrus* (the true types of which are *Megæra* and *Mæra*) and some smaller genera, which have recently been separated from it. All the species are Palæarctic, Indian, or Australian, and closely resemble the fulvous Southern varieties of *Ægeria*, or else *Megæra*, on at least one surface of the wings, even when the other differs considerably.

Our British species of *Epinephile* will likewise illustrate this genus. Several species allied to *Janira* occur in Western Asia and the Himalayas; the *Tithonus* group appears to be confined to South-west Europe and North Africa. The Chilian species, which have been referred to this genus, probably belong rather to separate genera of their own. There are several conspicuous Australian *Satyrinæ* of

different genera resembling *Satyrus Ægeria*, some measuring nearly three inches in expanse. They have generally a large eye at the tip of the fore wings, and another at the anal angle of the hind wings, though *Epinephile Abeona* has two eyes on the fore wings, that nearest the anal angle being the largest. This species is brown, with a fulvous band across the fore wings, and therefore resembles *Ægeria* less than the other Australian *Satyrinæ* of this group.

[NOTE.—In my last article, *Elymnias* is incorrectly spelled more than once.—W. F. K.]

ON THE PRESERVATION OF LEPIDOPTEROUS LARVÆ BY INFLATION.

By C. H. and H. M. GOLDING-BIRD.

THERE have already appeared in the pages of this magazine some useful papers on the preservation of lepidopterous larvæ by inflation. The method we are now going to describe gives as good results by less laborious means. Unfortunately the colour is not constant with many larvæ, so that an approximation to a natural appearance is the most that can be obtained. It is, therefore, all the more necessary to have command over the position of the insect, so that both stiffness and loss of colour together may not make it quite unrecognizable. We think our plan puts a good deal of power into the hands of the operator, and, as stated already, is in no way laborious, so that both amateur and professional will find pleasure in the process as well as in the results. Over the ordinary means employed (so far as we have been able to learn) it has the advantage (1) of exposing the whole length of the larva to the same temperature at the same time; (2) saving the operator's lungs, since the air is forced in from a pressure-bottle, in which it has previously been condensed; (3) allowing the larva to be placed in its characteristic position; (4) unless any special position is required, two larvæ can be inflated at once.

The requisite apparatus can be made by anyone possessed of the most ordinary mechanical skill, in a short time, and at very small expense. After describing it we will give the mode of manipulating a larva from first to last. To introduce

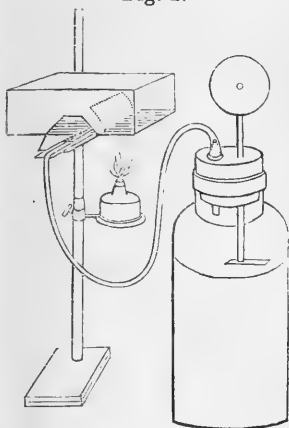
the air into the larva a glass tube, drawn out to a point, is necessary; several sizes should be prepared. This we will call the "spring-tube." It is best made of German hard glass, as it is less liable to accident, and will serve a long time. The size of the tube is not always proportionate to the size of the larva; often a small larva requires a larger tube and more inflation than a large one: thus, *Vanessa polychloros* requires a larger tube than *Dicranura vinula*, and more inflation. The best way to attach the larva to the tube is undoubtedly that described by Mr. Auld in last year's April number of the 'Entomologist,' where a figure of the tube is given; only we recommend but one steel spring, two—one above and one below—being, in most cases, not only unnecessary, but mischievous, as the under spring is apt to force the last pair of prolegs out of their place, and perhaps to break them off. However, this can be left to the fancy of the operator. The steel spring can be fastened to the tube by simply binding the two together with thread and securing with sealing-wax.

The oven in which the larva is baked is made out of a one-pound Colman's mustard-tin, prepared in the manner shown in the woodcut (fig. 1). Draw a knife along the soldered junction of one of the broad sides with the bottom, and then up on both sides from the extremities of the first incision towards the lid for rather less than two inches; the flap thus cut must be turned up into the cavity of the box to an angle of 45° , as the dotted line indicates. A second opening must be made in one of the narrow sides, of the shape and in the position shown: begin it two inches from the bottom of the box, close against the flap above mentioned; it should measure two and three-quarter inches across at its lower part, and one and a half inch above; its height should not exceed one inch and a quarter. The piece of tin removed from the hole, and still retaining its connexion with the box, should be turned down into the horizontal position, so that it may serve as a slab on which to rest the cork tray that carries the larva, and which is pushed into the opening. It is also a great convenience to have a piece of glass let into the lid, so as to admit more light. When in use the box is to stand on the broad side that has the first-described hole in it; it should be placed on a tripod or small retort-stand,

or if these are not to be had it can be balanced on a brick standing on end. It is essential that the part of the box in which is the first hole should project free of the support, so that the flame of the spirit-lamp (or gas jet) that gives the heat may enter the aperture. If gas be employed a Bunsen's burner, turned low, should be used. It will be understood that a larva put head first into the pyramidal, or second hole, will be exposed *along its whole length at once* to the heat of the flame that is burning in at the first hole, while the flap of tin that was turned upwards into the box not only prevents scorching, but equally distributes the heat all along the breadth of the oven. The sizes given for the apertures are found the best for this sized oven, and had best be carefully followed. To suspend the larva by its tail in a vertical position, with the flame just beneath it, as shown in the figure accompanying Mr. Auld's paper, before referred to, is, we believe, a miscalculated procedure, for surely the "head and shoulders" would be singed before the tail was half dry; also in the summer weather, when larvæ are easy to obtain, it could hardly be agreeable to spend an afternoon standing with one's face bending over the flame of a spirit-lamp.

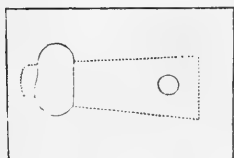
We will now describe the pressure-bottle, by means of which the air is forced into the larva. Obtain a strong bottle of not less than twenty ounces (one pint) capacity, about an inch and a half across the mouth: these can be bought at any chemist's; certain drugs are sent out in them from the wholesale houses. Get an india-rubber cork, exactly fitting and bored with two holes; into one of these holes a piece of glass-tubing three inches long is inserted (this is the "delivery tube"), and into the other a similar piece of glass tube, only double the length, so that it may project freely into the cavity of the bottle, and rise free of

Fig. 1.



the first tube above the cork outside. The end in the bottle is filed or ground flat, and then, with sealing-wax, fastened on to a small plate of metal (tin or zinc) of the exact size and shape shown in figure 2. This piece of zinc is bored

Fig. 2.



with a hole one-eighth of an inch in diameter, at a quarter of an inch from one end (as shown in the woodcut); the edges of the hole must then be smoothed down perfectly by rubbing the metal up and down a hone or piece of slate a few times. It is exactly over this hole the glass tube is fastened, so that there will be a free passage for the air through both, the junction of the tube and metal being rendered air-tight by the sealing-wax. Now fasten by its narrow end (in the position shown by the dotted line in the woodcut) a slip of thin gutta-percha tissue, or, still better, of oil-silk, by means of any cement, so that the broad end shall freely play over the hole; a valve opening inwards is thus made. To test the valve, suck at the free end of the tube, and if no air passes the valve is good; if any can be sucked through, it is useless, and a new one must be made. The causes of failure would be either using too stiff a piece of gutta-percha or oil-silk, or pieces that have fine holes in them, or else the valve-hole in the metal has not its edges smoothly ground down. By attending to these details anyone can soon construct a valve. The reason for using the india-rubber cork is that an ordinary cork (unless *very* sound) is not air-tight to the pressure of air employed, while if rendered impervious by the use of sealing-wax it could not be removed to clean or renew the valve. These corks, already bored, may be had at any chemical apparatus manufacturers,* and are most convenient, as they can be removed at pleasure. If the cork be now placed in the bottle with its tubes fitted in, and if the delivery tube be stopped up and air be forced in by the mouth through the valve, it will remain in the bottle if the valve be sound, rushing out with a small explosion only on opening the delivery tube. Strong though the puff of air

* *E.g.*, Messrs. Mercer and Townsend, Bishopsgate Street, London.

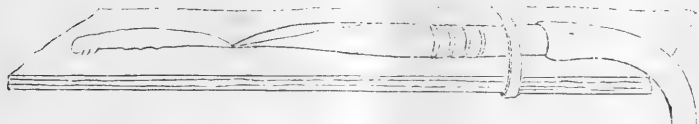
thus given seems, it is quite insufficient for the purpose in hand, and a far greater degree of pressure than can be obtained from the operator's lungs is requisite. To obtain this get a child's india-rubber ball, not under two inches in diameter; if it has a hole already in it bore another at one side with a hot wire, of rather more than the size of a crow-quill; should there be no hole at all two must be made, one at the pole of the ball, the other at its equator. These balls usually contain a good deal of sulphur in powder. After making the holes squeeze out all this powder, as far as you possibly can, or else the valve will be rendered useless by the powder falling on it. It is a good plan to push a little cotton-wool into the upper part of the glass tube bearing the valve; it filters the air as it passes down. Now push the ball by one of its holes on to the glass tube that bears the valve, and if not fitting accurately to the tube a little cobbler's wax will make it do so. If now the ball be pinched between the thumb and finger, the thumb being placed over the second hole, the air in the ball is bound to enter the bottle, while on removing the hand the ball again expands, air entering it by the hole that was just before closed by the thumb. The air in the bottle cannot be sucked out again by the ball, because of the valve; and so, by repeating the process, the bottle can be charged even to bursting, unless of good glass. Complicated though this description of the apparatus has been, it can all be made in less time than the account has taken to write; while the advantages it offers over air-pressure from the lungs are incalculable. To some persons, inflation of many larvæ in one day by the chest might be a serious evil; while to all it must be a very wearying, uncomfortable process; and since the air must of necessity be injected in an intermittent manner, the larva would be longer drying. With the exception of two or three feet of india-rubber tubing, every entomologist would have the remaining needful materials by him,—such as pins, cork, forceps, &c.

To prepare the larva, the following method is recommended:—Kill it in the cyanide bottle, or more speedily render it insensible with a few drops of chloroform; then, with a fine needle thrust in at the tail, stir up the viscera carefully, so that the needle may not pierce the skin, though even this seldom quite spoils it; now lay it on some

blotting-paper or soft rag in a straight position, and roll it firmly with a piece of glass tube, from head to tail, till all the contents are evacuated. It is best to begin rolling about the middle of the larva, for if the contents are driven too suddenly towards the extremity there is danger of bursting the skin: it is also to prevent this that the fine needle is first introduced. Traction with forceps on the extended viscera aids the process. When empty, the skin, which is now shapeless and shrivelled, must be taken in the left hand, and the aperture at the extremity opened fully with the forceps; the nose of the spring-tube is now introduced for a short distance, sufficient to allow the piece of watch-spring just to catch the tip of the anal flap; on blowing gently into the tube the skin will rise into shape, but will collapse instantly on ceasing the inflation. If the tube be very small, or the aperture in the animal large, the disproportion will allow of such an escape of air by the side of the tube that either the skin will not properly inflate or only do so by blowing fiercely. The happy mean in this, as in all things, can only be hit off by experience. The last segment may be pressed to the tube, and so made to fit closely enough. Indeed, it is no advantage to have an exact fit; some escape is desirable, so as to act as a safety-valve, and prevent the over distension of the specimen; occasionally it is well to prick the thin skin connecting the 2nd segment with the head, to prevent the latter being unnaturally forced forward. All being so far prepared, slip one end of the india-rubber tube over the free extremity of the spring-tube, and the other over the delivery tube of the pressure-bottle; now press the ball, and the skin will expand; and if the right balance between the size of the spring-tube and the aperture in the larva has been hit off, the skin will remain inflated with occasionally squeezing the ball. Light the spirit-lamp and put it in its place (higher than in the woodcut), so that the flame shall enter the opening in the box; lay the skin, attached of course to the spring-tube, on a flat piece of cork—the “tray,” and fasten it by an elastic band, as shown in figure 3; now put the cork into the oven, so that the larva lies well inside, and with a wooden American clip (clothes-peg) secure the side of the cork to the slab of tin that projects from the opening; continue the inflation, watching the degree to which the skin

is to be inflated; and in a few minutes the operation is completed. The exact amount of time and heat required are points on which we can only say, "Experientia docet." The head of the larva always dries last, so it is easy to tell if it is

Fig. 3.



quite done by touching the head or first pair of legs with a needle; if they move in the slightest the larva must go in again. Sometimes on raising the spring the larva will fall off without trouble; more often it sticks to the tube, and can only be removed by softening the last segment with a little water dropped from the end of a match: the larva can then soon be got off with the help of a needle; the superfluous water must be taken up at once with a little blotting-paper, and the flap closed down; put the larva on the cork, tail foremost, and let it remain in the oven a few moments to dry off the moisture. Attention to these details is specially urged, as we have seen otherwise good specimens spoiled by the distended aperture in the tail, which, while it gives a good view of the thorough cleansing the skin has undergone, can hardly be called desirable. Fortunately larvæ have a tendency to take the position natural to them: a *Noctua* could hardly be made to loop, while a *Geometer* can readily be fixed in its characteristic position with the help of a few short pins. *Geometers* are best laid sideways on the cork, if it is wished to arch them; indeed, any larva that is to be specially posed is best laid sideways. The larvæ must each be dried separately if they are to take a particular position, otherwise there is nothing to prevent inflating two together, the air-pressure being more than sufficient. To connect them with the india-rubber tube, have a piece of metal made at a tinman's of the shape of the Y used for butterfly-nets, only much smaller: it must be made hollow, so that by blowing in at the stem the air will pass out at each of the branches; the thickness of the metal should be such that it will fit

firmly into the india-rubber tube; the weight of the metal is a disadvantage; the Y would be better made of india-rubber.* To each of the branches attach about a foot of india-rubber tubing, and at the free end of each tube fit the spring-tubes, each holding a larva; these will lie side by side on the cork tray and dry together.

Mr. Auld has already described how larvæ should be mounted,—each on its particular food-plant; mounting upon straws looks very neat, but is not suggestive. Should the apparatus not be at hand when some special larva occurs, it is possible, though not recommended, to prepare the skins and put them by in cotton-wool, relaxing them in warm water later. If this be done the skins should be rolled very smoothly, or they will contract unevenly, and not expand in a satisfactory manner afterwards. We have not tried this with hairy larvæ. Perhaps a drop or two of glycerine mixed with water and injected into the skins would be a good plan, as it would prevent their drying up, only then the glycerine would have to be removed by syringing with warm water before they are baked, or the skins would not dry. For beginners it would be disheartening to set to work on a larva which even one accustomed to the work could not turn out to his own satisfaction. In their seasons *Abraxas grossulariata*, *Mania typica*, *Orthosia ypsilon*, and *Nyssia zonaria*, are easy to work upon; but this is foreign to our purpose now, as is also the preservation of colour. We will only add that larvæ are best chosen a few days after their last moult. The presence of ichneumons in the larvæ does not unfit them; though occasionally, if they have crawled out, the skin will be distorted.

It requires a good deal of resolution to kill a choice larva, especially when you would like it to figure in your cabinet as a perfect insect (an instance of one of the many cakes that we cannot both eat and keep); but then, when the die is cast and the skin rolled out, how great is your satisfaction when you dislodge some scores of ichneumons, of whose existence you had had no suspicion; and you rejoice both in “doing” the ichneumons, and in preserving as a larva what

* This can be easily done by cementing three pieces of india-rubber tube in the required position with gutta-percha dissolved in chloroform or bisulphide of carbon.

would never have been a moth. We can speak feelingly, having had this experience only to-day. When young larvæ differ very much from the adult form, it is desirable to preserve them before they have lost their early markings. In this stage they require especial care, as the tender skin is liable to swell unnaturally. Small larvæ, requiring a very fine tube, can often be attached without the use of a spring, simply by pressing the skin carefully to the tube, and letting it stand a minute before inflating. In this case there is rather more trouble in getting the larva off the tube; it should, therefore, be pushed in only just far enough to hold it firmly. Avoid fingering the larvæ skins more than absolutely necessary; it is apt to rub the hairs off the hairy larvæ, and bruise the skins of the smooth; forceps should in this case come before fingers. *Liparis chrysorrhæa* does not turn out so well as some; but even this dreaded larva can be managed with so little contact with the fingers that the operator will probably escape without suffering pain from the barbed hairs. Anyone who has spent an afternoon in the society of *Cossus ligniperda* will be astonished to find how much can be done with very little fingering. It would of course be a great saving of time to have both hands at liberty during the drying: this could be managed by dispensing with the ball, and connecting the free end of the valve-tube with the nozzle of a pair of bellows by a piece of india-rubber tubing; the bellows could be worked with the foot; a spring should be inserted between the handles to make them open again after compression.

We hope the explanations given have been sufficiently clear to put one who has never attempted the work into the way of doing it satisfactorily, and certainly at little cost; whilst those who are skilled will perhaps be glad to practise a simple and harmless mode of inflation. The pressure-bottle is not a new invention, though newly applied and somewhat modified: it is used by microscopists for injecting small animals.

We now end with a caution and an apology: for the former—when you are about to uncork the bottle be careful not to strike the plate of metal against the side of the bottle, or you will injure the valve, and perhaps break it; for the latter—we must greatly have offended entomological ears by

using the word "tail," instead of speaking of the "12th and 13th segments," or the "posterior extremity;" it was done for the sake of brevity, and not in disregard of the grammar of the Science.

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR's 'Die Mitteleuropäischen Eichengallen.'

By EDWARD A. FITCH.

(Continued from p. 209.)



Fig. 71.—*S. TRICOLOR*.



Fig. 72.—*S. ALBIPES*.

71. *Spathogaster tricolor*, Hart.—Although at the first glance it is easy to separate *S. tricolor* from *S. baccarum*, still the galls are much like one another. The gall of *S. tricolor* is also round, also contexturate with the leaf, very sappy, and attains at most to a diameter of but 4.6 millimetres, and is covered, though not thickly, with fine, soft, simple, very rarely branched, hairs, of from 1 to 2 millimetres in length; the periphery of the gall is often disturbed by small conical projections. The disk on the under side of the leaf of *Quercus sessiliflora*, on which the gall occurs, is smaller and less arched than in the gall of *S. baccarum*. The figure is taken from specimens preserved in spirit, which Herr v. Schlechtendal had the kindness to send me. The fly appears, according to the same authority, in the first fortnight of July, whilst the gall may be found in May.—G. L. MAYR.

This species is at once distinguishable from the former by its hairiness, as in Britain the pubescent galls of *S. baccarum* are unknown, owing to the absence of *Quercus pubescens*. I

have found it in many localities, but nowhere abundant; and it is not recorded from Scotland. Rev. T. A. Marshall, who described it (*teste* Parfitt) as the production of *N. fumipennis*, speaks of it as "exceedingly common near London" (E. M. M. iv. 146): like *S. baccarum* it may occasionally be found on the upper side of the leaf. As inquilines of this gall Dr. Mayr gives *Synergus albipes*, H., *S. facialis*, H., and *S. thaumacera*, Dalm., all appearing in June and July of the first year. Of parasites Mr. Rothera has bred a *Eurytoma*, a *Callimome*, and a *Pteromalus*; these all in July.—E. A. FITCH.

72. *Spathegaster albipes*, Schenck.—This small gall—rare in the neighbourhood of Vienna, but common in Saxony and Nassau—is somewhat similar to those of *A. burgundus*, Gir., and *A. circulans*, Mayr; it may be found immediately after the appearance of the leaves of *Q. sessiliflora*, either at the margin or on the midrib of the leaf: in the latter case the leaf becomes crumpled, and is sinuate to the midrib; very rarely it may be found on the petiole. It is greenish yellow, subsequently yellow; elongately oviform, with a longer axis of 2 millimetres long by 1 broad, generally bordered with little protuberances on the free side opposite the line of attachment; its surface is hairy when immature, later on it is mostly bald. With the help of a strong glass we may see the rounded cells of the gall (which Prof. Schenck has described as very small protuberances). The section shows that this gall has only a thin cellular wall and a relatively large chamber for the larva, which appears in the perfect state in the middle of May.—G. L. MAYR.

This gall, which is figured by Malpighi, has been recorded as British by Mr. Cameron, who thus speaks of it:—"I find it commonly around Glasgow. The very small size of the gall renders it easy to be overlooked" (E. M. M. xiii. 200). Schlechtendal says "this species is intermediate between *Andricus* and *Spathegaster*, both as regards the structure of the fly itself and of its gall;" and then remarks on the similarity of its gall to that of *A. curvator*. There might be some evidence here for Mr. Bassett. Dr. Mayr received *Synergus apicalis*, H., as bred by Schenck, from this gall; but he thinks it more probable they were connected with *Noduli* galls.—E. A. FITCH.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

COLIAS EDUSA; A SECOND BROOD.—This year of 1877 will be known amongst entomologists as “the great *Edusa* year;” for following the abnormal first brood of this butterfly, which appeared in unusually large numbers in June last, there is now occurring a second brood, after a distinct interval of disappearance of the imagines in the middle of July. During this August *Colias Edusa* appears to have occurred in profusion in most districts visited by collectors throughout England. Nor has it been confined to its usual haunts. It has been frequently observed in suburban gardens, and even in the crowded streets of London, and other large towns. As it is impossible to print all the contributions—which exceed one hundred—received on the subject of *Colias Edusa*, I must content myself by thanking our correspondents for their attention, and ask them to accept the apology of “want of space” for not inserting their notes. This second brood of *Colias Edusa* dates from about July 25th, when odd examples were found; but July 30th appears to be the first day upon which it is reported as very common. As regards *Helice*, the notes of its capture show it to be very widely distributed, and in varying proportion to *Edusa*. One *Helice* to seven *Edusa* seems to be the largest number recorded. Probably at the end of the season a special article will appear on this subject, with a tabulated list of observations on the appearance of *C. Edusa*.—JOHN T. CARRINGTON; August 22, 1877.

ABUNDANCE OF COLIAS EDUSA.—I send herewith my experience of the abundance of *C. Edusa* this year, as I think the more notes that can be collected on the subject the better. All I have observed here in previous years have been two specimens in October, 1869. This year, on coming down here at the end of July, I heard they had been seen more or less all the summer; but whether hibernated specimens or not I am unable to ascertain. On July 30th and 31st I found them abundant in a large, rough meadow; and individuals were, and are still to be, met with everywhere. On both the above-mentioned days I saw a pair *in cop.*; and all the specimens I took, except one or two, were beautifully fresh,

evidently just out. There are still plenty about, only of course more worn. I may mention that wherever I have been this year I have seen specimens. On June 11th I saw one at Wormwood Scrubbs during the Middlesex Rifle Meeting.—WALDEGRAVE; Bookham Lodge, Cobham, Surrey, August, 1877.

VANESSA ANTIOPA AT NORWICH.—On August 18th a friend of mine saw a specimen of *V. Antiopa* in a street in this city, but was unable to capture it.—R. LADDIMAN; Norwich.

VANESSA ANTIOPA IN THE ISLE OF WIGHT.—I should like to record in the 'Entomologist' the capture of a good specimen of *V. Antiopa* in a field near Shanklin, Isle of Wight, on the 6th of August.—R. OAKESHOTT; 161, Sloane Street, S.W., August 23, 1877.

SPHINX CONVULVULI LARVA.—I received the other day a fine larva of *S. convulvuli*. Within twenty-four hours after obtaining it, it buried in the earth at the bottom of the breeding-cage in which I had placed it. I had only time to compare it with the very complete description given by the late Edward Newman in the 'Entomologist' (Entom. viii. 272).—J. B. PILLEY; 2, High Town, Hereford, August 23, 1877.

ACRONYCTA ALNI AT THREE BRIDGES.—I joined the South London Entomological Society's annual excursion (for Tilgate Forest) on Monday, August 6th, and spent a few hours in the forest. A small larva beaten off birch fell into my net, resembling very curiously a bird's dropping, having the anal segments of a dirty white colour, the anterior segments being blackish with whitish markings. When at rest with the head turned back its appearance was fully calculated to deceive a casual observer, and probably also its natural enemies—the birds. The larva was quite unknown to my fellow-members; and though I was disposed to think it might belong to *Acronycta alni*, simply from the fact that it was evidently an *Acronycta* and was different to the commoner species of that family, this idea received no support. On the following day my larva cast its skin without undergoing any noteworthy change in its appearance, except that it had a pair of long hairs near the head and shorter hairs on the body. The curious resemblance to the bird's dropping was as before. After this moult the larva fed well upon birch for five days, when it spun a web on a birch leaf and prepared to moult

again. This change I anxiously watched; and on the 14th inst. I had the pleasure of observing the most wonderful transformation in the appearance of a larva that I have ever witnessed. It is now veritably *A. alni*. It has lost all traces of dirty white markings; its ground colour is a beautiful black, and the usual conspicuous yellow markings are very striking, being uniform throughout, while the long clubbed hairs on each segment give it somewhat the appearance of a centipede. My larva is now (August 16th) feeding well upon birch. In 1874 I found a larva of *A. alni* in the New Forest, which produced a fine imago the following year; but it was full fed at the time that I found it, and I could not tempt it to eat.—J. PLATT BARRETT; 34, Radnor Street, Peckham.

ACRONYCTA ALNI.—I captured a larva of this species at Seven Oaks, on the 12th inst.—T. LOVELL; August, 1877.

DORYPHORA DECEMLINEATA.—I have had much practical acquaintance with the Colorado potato-bug in Canada, where every year it appears on my farms. I do not consider there is any need for panic in this country, even if it does become a colonist. I have successfully caused its almost total suppression each year on my land by the liberal use of Paris green (arsenite of copper), although every season it reappears in equal numbers. Two applications of a solution of this chemical poison has always been, in my experience, effectual. I have it applied wet now, although I once tried it as a dry powder when the dew was on the haulm; but this was very dangerous, causing illness to the workmen who inhaled the powder as it blew about with the wind. I quite disagree with the *savants* of the British Association and others who consider this climate too humid for its development, especially during hibernation. In Canada I have dug them out of the mud, which was knee deep, in the spring of the year. This was in low ground, and before the higher table-land was thawed out. I have even kept them as an experiment in water; but when taken out and placed in the sunshine they soon revived, seemingly none the worse. Once, while on a visit at Chicago, I saw them crawling on the docks in countless numbers: the water had been covered with them for weeks. I took some of these apparently lifeless insects out of the dock and put them where the sun shone on them, when they shortly crawled away. In Canada, generally, comparatively little damage has been done by the beetle, on account of careful

farming and the use of Paris green I anticipate that should it effect a settlement in Britain the damage will be greatest where there is careless farming.—G. A. FARINI; Royal Aquarium, Westminster, August, 1877.

AN ACT FOR PREVENTING THE INTRODUCTION AND SPREADING OF INSECTS DESTRUCTIVE TO CROPS.*

I.—The Lords and others of Her Majesty's Most Honourable Privy Council (in this Act referred to as the Privy Council) may from time to time make such Orders as they think expedient for preventing the introduction into Great Britain of the insect designated as *Doryphora decemlineata*, and commonly called the Colorado beetle. Any such Order, if the Privy Council think fit, may prohibit or regulate the landing in Great Britain of potatoes, or of the stalks and leaves of potatoes, or other vegetable substance, or other article, brought from any place out of Great Britain, the landing whereof may appear to the Privy Council likely to introduce the said insect into Great Britain, and may direct or authorise the destruction of any such article, if landed. If any person lands or attempts to land any article in contravention of any Order under this Act, such article shall be liable to be forfeited in like manner as goods the importation whereof is prohibited by the Acts relating to the Customs are liable to be forfeited; and the person so offending shall be liable, according to those Acts, to such penalties as are imposed on persons importing or attempting to import goods the importation whereof is prohibited by those Acts.

II.—The Privy Council may from time to time make such Orders as they think expedient for preventing the spreading in Great Britain of the said insect. Any such Order may, if the Privy Council think fit, direct or authorise the removal or destruction of any crop of potatoes or other crop or substance on which the said insect in any stage of existence is found, or to or by means of which the said insect may appear to the Privy Council likely to spread, and the entering on any lands for the purpose of such removal or destruction, or for the purpose of any examination or inquiry authorised by the

* Legislation on entomological subjects in this country being very exceptional, it may be well to quote the above extracts from the Act of Parliament, passed August 14th, 1877. The portions left out are purely technical, and uninteresting to the general reader.—ED.

Order, or for any other purpose of the Order. Any such Order may, if the Privy Council think fit, prohibit the keeping, selling, or exposing or offering for sale, or the keeping of living specimens of the said insect, in any stage of existence, or the distribution in any manner of such specimens. Any such Order may impose penalties for offences against the Order, not exceeding ten pounds for any offence; and those penalties shall by virtue of this Act be recoverable, with costs, on summary conviction before two justices of the peace, and shall be applied as penalties recovered under the Contagious Diseases (Animals) Act, 1869, are applicable.

III.—Where by any Order under this Act the Privy Council direct or authorise the removal or destruction of any crop, they may direct or authorise the payment by the Local Authority of compensation for the crop; and the Local Authority shall pay the same, subject and according to the following provisions:—1. In the case of a crop on which the said insect, in any stage of existence, is found, the compensation shall not exceed one half of the value of the crop. 2. In every other case the compensation shall not exceed three-fourths of the value of the crop. 3. The value of the crop shall in each case be taken to be the value which, in ordinary circumstances, the crop would have had at the time of its removal or destruction. 4. The Local Authority may, if they think fit, require the value of the crop to be ascertained by their officers or by arbitration. 5. The Local Authority may, if they think fit, withhold compensation if, in relation to the crop, the owner or the person having charge thereof, has, in their judgment, done anything in contravention of, or failed to do anything in compliance with, any Order under this Act.

IV.—The Local Authorities under the Contagious Diseases (Animals) Act, 1869, with their respective districts, local rates, clerks, and committees, shall be in like manner Local Authorities for the purposes of this Act. The Privy Council may, if they think fit, require a Local Authority to carry into effect any Order of the Privy Council under this Act. The expenses incurred and compensation paid by a Local Authority in pursuance of any Order under this Act shall be paid by them out of the local rate.

This Act may be cited as The Destructive Insects Act, 1877.

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[No. 173.

STRENIA CLATHRATA.



STRENIA CLATHRATA (varieties).

THE two interesting varieties of *Strenia clathrata*, figured above, are from specimens in the collection of Mr. Stevens. They were originally in the collection of the late Dr. Harper; but the precise locality of their capture is not known. The figures are drawn by Mr. Willis, and engraved by Mr. Kirchner.

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY,

Assist.-Naturalist in the Museum, Royal Dublin Society.

No. IV. NYMPHALIDÆ—SATYRINÆ.

PART II.

THE genus *Hipparchia* is Palæarctic and North American, being perhaps best represented in Western Asia. All the American species belong to the same group as the European *H. Phædra*, and are dark brown, with two black eyes with

blue pupils on the fore wings; sometimes these are placed on a fulvous or tawny band. In the *Statilinus* group the eyes are smaller, and have often two white dots between them; and this shades into the *Semele* group; and this again into the *Briseis* and *Circe* groups, where there is a white or yellowish band, more or less divided by the nervures, across both wings. Three or four North Indian species, closely resembling *Circe* in appearance, have been separated under the generic name *Aulocera*. Two of the most interesting *Hipparchiæ* from Western Asia are *H. Bischoffii*, in which the hind wings are fulvous, and *Parisatis*, uniform brownish black, edged with bluish white.

Mycalesis is a large genus, to which most of the smaller *Satyrinæ* from Africa, Asia, and the Australian Region, belong. They are usually brown, but sometimes fulvous, yellowish, white, or even purplish. (I forgot to mention before that many dark-coloured *Satyrinæ* exhibit a bluish, purplish or greenish lustre in some lights. This is very conspicuous in some of the European species of *Hipparchia* and *Maniola*.) *Mycalesis* usually exhibits more or less of a marginal row of eyes; but the most conspicuous, and often the only one visible above, is usually that nearest to the hinder angle of the fore wings. There is usually a transverse pale line running across all the wings beneath, within the eyes. These insects are usually about the size of *S. Janira*; but the genus *Ypthima*, and its allies which follow, are seldom much larger than *Cænonymphæ*. Their range is similar to that of *Mycalesis*, but they may be at once distinguished from it by their uniform brown colour, with a black eye in a yellow ring near the tip of the fore wings, always enclosing two white pupils. There is usually a variable number of eyes on the hind wings, most numerous beneath.

After this genus comes *Heteropsis*, a small dark brown butterfly from Madagascar, remarkable for the produced tips to the fore wings.

The genus *Cænonympha* is European and Californian; the Californian species are paler than ours. The South Russian *Triphysa Phryne* is remarkable for the disparity of the sexes; the male is brown, and the female dirty white; the under surface has conspicuous white nervures.

Cænonympha is replaced in Australia by *Hypocysta*, which resembles it in size and colouring, but has two eyes on the hind wings, at least below; and occasionally on the fore wings also. One species, *H. Osyris*, is brown, with the centre of the wings filled with white instead of tawny, and a very large black eye in a yellow ring, and bipupilled with white at the anal angle.

Eteona Tisiphone is a South American butterfly, measuring nearly two inches across. It is brown, with the centre of the hind wings and sometimes part of the fore wings filled up with straw-colour, divided by the nervures into spots; the under side is much paler, and the oval spots form a band across both wings, giving the insect very much the appearance of *Archonias*, a genus of *Pierinæ*, under which it was originally described.

Lymanopoda contains some South American species, about one and a half to two inches in expanse. The wings are usually reddish brown, with a pale stripe or row of spots across the hind wings beneath. Some species, however, are whitish above; and others have the pale stripe absent, and the veins beneath black.

Calisto includes a few small species confined to the West Indies and the adjacent parts of America. They are black or brown above, sometimes tinged with reddish, and have a large eye (sometimes bipupilled) at the tip of the fore wings beneath, and a smaller one on the hind wings. This genus, like the last, has the wings entire.

Zipaetis, the last Old World genus of the family, has some resemblance to the *Elymniinæ*. It contains two Indian species. *Z. Saitis* is over two inches in expanse, brown above, with a white transverse band across the fore wings, and a submarginal band on the hind wings, dentated on the outside, as is the hind margin itself; under side similar, but with four eyes on the hind wings, the two largest being inside, and separated by an interval; one of them is bipupilled.

The three species of *Steroma* vary from one and a quarter to two and a quarter inches in expanse. They are brown or black insects, with the outer margins much indented, and with a conspicuous indentation on the inner margin of the hind wings, near the anal angle; the under side of the hind

wings is dark brown, sprinkled with metallic scales, and a more or less complete marginal row of metallic dots.

The genera *Pedaliodes*, *Gyrocheilus*, *Oxeoschistus*, *Lasiophila*, *Dædalma*, and *Pronophila*, contain large and handsome insects, measuring two or three inches in expanse, and chiefly confined to the mountainous districts of Western America.

Pedaliodes may be distinguished from *Lymanopoda* by the dentated hind wings, and from *Steroma* by their entire inner margin. Many species resemble these genera in markings; others are striped or banded with white and fulvous.

Gyrocheilus Patrobas is a Mexican species, with smooth eyes; the other allied genera have them hairy. It is two and a quarter inches across; brown; the fore wings with four white dots, surrounded with black below; and the hind wings with a red marginal band.

Oxeoschistus has strongly dentated hind wings; the species are fulvous beneath, with pale transverse lines more or less conspicuous; some are brown above, with a broad submarginal fulvous band enclosing black spots; another is dark brown, with a very large pale blue spot, dentated externally, on the outer half of the hind wings.

Lasiophila and *Dædalma* are much dentated, the hind wings often with a short tail. The former is reddish above; the fore wings brown towards the margins, spotted with red, and the hind wings either similar, or red, bordered with brown, and with a row of brown spots on the outside of the red portion. *Dædalma* is usually brown above, sometimes with submarginal pale spots; the under side of the hind wings is marbled with greenish or reddish, with traces of a central row of eyes.

The species of true *Pronophila* resemble each other closely. They are all large dark-brown insects, occasionally with some white spots near the tip of the fore wings, above as well as below. On the under side they have three or four conspicuous black eyes, with blue pupils on the fore wings, and sometimes a row of smaller ones on the hind wings.

The species of *Taygetis* vary from two to four inches in diameter, and are found in most parts of Central and South America. They are brown above, occasionally with fulvous

markings towards the hind margin of the fore wings, or a fulvous border to the hind wings, which are moderately dentated; the under side is paler, generally with two transverse lines, outside which runs a row of eyes, often reduced to pale dots. One species (*T. Mermeria*) has very acute tips to the fore wings.

The species of *Corades* chiefly inhabit Western South America. The hind wings are not much dentated, but are produced at the anal angle into a short tail. The species are nearly three inches in expanse, dark brown; the fore wings sometimes spotted on one or both surfaces, and the hind wings above washed with fulvous; the under side of the hind wings is generally crossed by at least one transverse line.

The Brazilian *Bia Actorion*, which is often referred to the *Morphinæ*, should perhaps form a subfamily by itself. It is a brown insect, about two inches in expanse, with a curving, transverse, fulvous band near the tip of the fore wings, and a bright purplish blotch on the outer half of their inner margin. The male has a conspicuous tuft of hairs on the inner margin of the hind wings, which are produced into a short tail at the anal angle; the under side is brown, covered all over with short yellow stripes, and dusted on the hind wings with bluish; on the hind margin of the fore wings, towards the tip, is a black eye in a yellow ring, with a blue pupil; and there are one or two yellow spots near the costa of the hind wings.

A Catalogue of the *Satyridæ* in the British Museum, by A. G. Butler, was published in 1868; and the most important monographs of separate groups are those by Butler, on *Euptychia*, in the Proceedings of the Zoological Society for 1866 and 1867; and by W. C. Hewitson, on *Pronophila* and *Ypthima*, in the Transactions of the Entomological Society of London, ser. 3, vols. 1 and 2.

GEOMETRA PAPILIONARIA.—I caught a specimen of this beautiful insect at rest on a lamp, on August 12th. I have collected for some time in this neighbourhood, and have never seen a specimen of this insect here before.—G. R. PIGG; Withington, Manchester.

TURNIP AND CABBAGE-GALL WEEVIL, *CEUTORHYNCHUS SULCICOLLIS*.

By E. A. ORMEROD.

Fig. 1.



Fig. 3.



Fig. 2.



Fig. 1.—A, B, C. Jaws of the cabbage, turnip and swede turnip weevil larva, respectively.

Fig. 2.—The earth cell of the *C. sulcicollis* pupa, and the cell in its chamber, both magnified.

Fig. 3.—A cabbage root, with galls of *C. sulcicollis*.

THE *Ceutorhynchus sulcicollis*, or turnip-gall weevil, is, perhaps, of no very great importance in its attack on turnip roots, as except when in unusual quantities the galls it gives rise to can be used for sheep food like the rest of the root, though the quality of the bulb suffers materially. With the cabbage it is a different matter, here its attack is sometimes a serious injury; and the enormous extent to which it exists in some of our cabbage-growing districts, both in England and Ireland, make its habits of some degree of interest.

The small, black-gray weevils, scarcely more than a line in length (and from their habit of feigning death when alarmed, eluding all but the most careful search), are well known, and appear in the specimens I have reared from larvæ taken out of galls on the cabbage or common white turnip roots, to be exactly similar in both cases. The pupæ, also, have precisely

the same form of earth cells, and the larvæ are similarly thick, legless, corrugated grubs, their heads furnished with strong jaws ochre-coloured, shaded to dark chestnut at the tips, and armed with two well-defined teeth, and a third much smaller one (fig. 1: A, cabbage larva; B, turnip larva), sometimes little more than a tubercle on the inner side. The only difference observable was a rather more ochreous tint in the grub from the turnip than in that of the cabbage, which was almost white; and in the *Ceutorhynchus* larvæ from galls of swede turnip the general colour was more ochreous still, conjecturally, in both this and the white turnip from the nature of the food. Here, however, there was a slight structural difference, for the third tooth or tubercle on the jaws was absent from the larva of the swede weevil in the specimens I had for examination, and the teeth themselves were smaller (fig. 1: C, swede larva), and obtuse at the extremity. They formed their earth cases for pupation about the same distance below the surface as the others, but development, from some unknown cause, did not proceed, so that I had no perfect beetles of these for comparison.

The cabbage and white turnip grubs appear very indifferent to interference: on the galls being opened, whether apparently fully grown or not, they almost invariably buried themselves at once in any earth they might be laid upon; and if in a few days their earth-cases were broken into for examination they would reconstruct them. These cases were about an eighth to three-sixteenths of an inch long, obtusely oval, though somewhat irregular in shape, and lying loose in the hollow chamber from which their materials had been taken (like a dry kernel in a nut-shell). The nature of the structure varied a little with that of the surrounding materials, being chiefly of earth, with a few minute pebbles adhering in the case of the turnip larvæ, and with the addition of a little vegetable matter in those of the cabbage (fig 2: cell, and cell in its chamber, magnified). With the cabbage grub the case was sufficiently advanced to cover a quarter of its length two days after it had buried itself. The method of procedure appeared first a commencement at the tail end, then holding on by the caudal extremity to this growing structure, so that if disturbed it still carried its partly-formed husk with it. The larva gradually built its earthy covering onward around it,

moistening it so plentifully as to show wet patches on the inside from time to time as the work proceeded. When complete the case was smooth inside, with a lining of whitish or yellowish gummy material, and externally the slightly rough earthy surface sometimes showed faint concentric rings from the regularity with which the grub had built the structure onward, and a depression at one extremity from the closing aperture preventing the tenant reaching out for further supplies of material. The time occupied from the disappearance of the larva to the appearance of the developed beetle was, both in turnip and cabbage, not exceeding two months, never less than about fifty-four days in any of the observations, which were taken about the beginning of summer.

In the case of the cabbage the large abnormal gall growths in themselves do injury by drawing off the plant-juices from their proper objects, and in their great aggregations where they may be found either forming the great masses known as club (fig. 3), or diseased growths indistinguishable from it, they cause loss to the growers; from its different amount of appearance on the ground, when differently managed, in the same neighbourhood, the disease would appear to admit of some remedy.

In looking over the cleared plants in the great cabbage-growing district round Isleworth, I have found heaps, amounting to several cart-loads, in one spot, all badly affected by the weevil-gall, and at the same time another deposit would be almost free. The disease, that is the insect presence, whatever else may promote it, appears steadily to increase in proportion to the degree in which cabbage crops without intermediate change, or with insufficient change between them, are grown on the same spot. One piece of ground, where the cabbage stalks (with whatever weevil-grubs might be in them) were regularly buried on the ground, was well known for the quantity infesting it; on the other hand, in a fair-sized garden, where when first the experiments began the beetle was plentiful, it has now nearly disappeared, before deep digging and new soil.

In an excellent paper on "Aubury," by Mr. Goodiff, of Granard, in the 'Gardener's Chronicle and Agricultural Gazette' for 1853, the presence of the weevil may be traced similarly on a large scale, from growing for wholesale

supplies constantly on the same ground. On a large plot, "which had for several years" been planted with cabbage, the plants suffered severely from the disease (that is anbury, with weevil larvæ contained in it), though they were planted free from it out of the seed bed. At the same time turnips, and about twelve hundred borecoles, planted outside what might be called the "cabbage-sick" spot of ground, escaped; and in a part of this spot, which had been dug "deeper than ever it was dug before," about eight hundred cabbage plants, put in to replace the weevil-destroyed crop, entirely escaped also. The paper is valuable from simply giving a note of agricultural treatment and losses in connection with anbury and weevil presence on a large scale; and, when interpreted by knowledge of the habits of the weevil larva from an entomological point of view, with the absence or presence of the "pest" varying in different places according to persistence or rotation of crops, helps to suggest that with a little care we might be much freer from its injuries than we are at present.

Spring Grove, near Isleworth,
August 7, 1877.

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR's 'Die Mitteleuropäischen Eichengallen.'

By EDWARD A. FITCH.

(Continued from p. 235.)



Fig. 73.—*S. VERRUCOSA*.

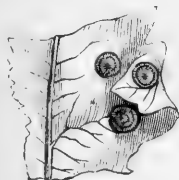


Fig. 74.—*S. VESICATRIX*.

73. *Spathegaster verrucosa*, Schlechtendal.—Of this beautiful gall I have five dry types now lying before me. It may be found, according to Schlechtendal, by the beginning of May on the young, sappy oak leaves (presumably of *Quercus*

sessiliflora or *Q. pedunculata*, as no other oak occurs near Zwickau), and stands next to the gall of *Spathegaster flosculi*, Gir. (= *Giraudi*, Tschek.), in form, structure, and pubescence. It occurs on the midrib or on a side rib, is fusiform, 3.5 to 5.3 millimetres long by 2 to 2.4 millimetres broad, and is abruptly and bluntly conical at its extremities; it is greenish yellow, partially rosy, and is said to be blue-green in its young state; it is thickly covered with soft, pustular hairs, which become depressed when the gall is dried; it is thin-walled, and encloses a large larva-cell without an inner gall. According to Von Schlechtendal the fly appears in the second fortnight of May. It is very probable that *S. verrucosa* and *S. flosculi* are the same species, as, apart from the galls being so similar, I am unable to differentiate the flies.—G. L. MAYR.

This is not known as a British species.—E. A. FITCH.

74. *Spathegaster vesicatrix*, Schlechtendal.—According to three typical examples now before me, this gall, which to judge from the specimens of the leaves occurs on *Quercus sessiliflora* or *Q. pedunculata*, appears as a circular swelling of the leaf, measuring from 2 to 3 millimetres in its horizontal diameter, so that the epidermis of the upper side is separated from that of the under side by about 1.3 millimetre; the green or whitish surface of the upper side has in its centre a little conical projection, from which small ribs radiate to the margin of the gall; the surface of the under side is without the papilla, and it is not so regularly ribbed. The larva lives between these two moderately convex surfaces, without being enclosed in an inner gall. One old gall, which is embedded in a brown leaf, is of a brownish yellow colour, has a much harder upper surface, is not transparent, nor does it show any signs of being ribbed; the similarly-coloured under side is quite flat. Since the description of this gall appeared in the 'Stettiner entomologische Zeitung,' 1870, p. 397, Herr von Schlechtendal has bred the fly, of which I have two specimens, at the beginning of June. A similar, though decidedly different, blister-gall I have found on *Q. pubescens*, as well as a second on *Q. cerris*, but have obtained the producer from neither.—G. L. MAYR.

Miss E. A. Ormerod has written me as follows respecting this species:—"I found galls of this species first on *Quercus*

pedunculata, on July 27th, 1873, and noted it as affecting both sides of the leaf; flat on the upper surface, with a blunt central point and ribs radiating from the centre, but only showing near the margin; the gall forming a shiny circular space on the upper side of the leaf, and beneath it the shape is similar, round and somewhat convex. During the following days, up to July 30th, I found a good many specimens; but though a very few were still green, the galls for the most part seemed past their maturity: some were dry, empty, and perforated; and many had the insect contents dead and distorted. On August 1st there were no live *Cynipidæ* in any of them, and from the state of the galls it appeared as if the gall-maker made its escape before the altered cuticle of the leaf died completely. I noted a brilliant green parasite with black striped abdomen; and in one light-brown gall were two of what I conjecture to be inquilines, but had no means then of determining." Dr. Traill has described it thus:—"On Saturday, July 5th (1873), I found galls of this species common in oak leaves, at Banbury, where I had seen a few about a month before in their earlier stages, without recognising them as galls. This species also is, I believe, new to Britain. They are sunk in the substance of the leaf entirely at first, but as they approach maturity they project both above and below, forming a very low double cone, and enclosing a cavity of some size, the walls being very thin. When mature they are readily seen, being whitish, while the leaf is green; but till maturity they are green like the leaf. They are then very difficult to find, the readiest eye-mark being the radii which pass from a small knob in the centre to the circumference. On the upper surface this arrangement is very regular and distinct, but it is less regular below, and there is no central knob. Both surfaces are naked. The form is oval, about one-eighth by one-twelfth. Almost all that I found were empty, but a few contained inquilines." (Scot. Nat. ii. 171). This gall is probably widely distributed, though unnoticed, in Britain. I have found it at Maldon sparingly, but never bred an inmate.—E. A. FITCH.

S. BRADBURY.—The cottony galls upon the oak are produced by *Andricus ramuli*, one of the *Cynipidæ*.—ED.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

VANESSA ANTIOPA AND SPHINX CONVULVULI IN THE ISLE OF WIGHT.—I took a good specimen of *Vanessa Antiopa*, on September 3rd, with my hand, whilst it was drinking the sap of a partially decayed oak tree, in Puckpool Battery, Ryde. I also took a specimen of *Sphinx convolvuli* at light, on September 16th, in Puckpool Battery.—HENRY BENSON; Jesus College, Cambridge.

VANESSA ANTIOPA AND SPHINX CONVULVULI IN ESSEX.—On September 6th, 1877, I had the good fortune to capture a fair specimen of *Vanessa Antiopa* at Chingford, and saw two others. On the 17th I took a fine specimen of *Sphinx convolvuli* at Whip's Cross.—W. DOWNING; Whip's Cross, Walthamstow, Essex.

ARGYNNIS AGLAIA.—I want to know something about the appearance of this butterfly. Did it occur this season at the usual time? I have generally found it with the smaller fritillaries; but I have searched for it over and over again in its usual haunts, and the first specimen I met with was on August 2nd; then I, with three others, took six specimens between us. On the 4th we took thirty more, and several since. It is still flying, but very much battered about.—V. R. PERKINS; Wotton-under-Edge, August 20th, 1877.

ARGYNNIS ADIPPE.—I had the good fortune to capture a nice variety of *Argynnis Adippe* at Three Bridges, on August 6th. My friend Mr. Wellman drew my attention to one of the finest and most extensive views in the Forest, including Leith Hill, Box Hill, and the Downs stretching through Surrey and Kent. To obtain a more eligible standpoint he led me across an open space in the Forest, and here the *A. Adippe* settled on a flower, its dark markings showing it to be a variety, before I was able to make a closer examination. The under side of the insect is also peculiar.—J. PLATT BARRETT; 34, Radnor Street, Peckham.

PAPILIO MACHAON IN KENT.—In August last I was informed that no less than six larvæ of *Vanessa Antiopa* had been found in the neighbourhood of Greenhithe. Hearing, however, that they were feeding on garden rue, and were of a bright green colour, with orange spots on the back, I need scarcely say that I was incredulous. I went to see them, and,

as I anticipated, saw three larvæ of *Papilio Machaon*, three having already turned to pupæ. It was a curious place for these larvæ—a herbalist's garden on the top of a chalk-hill, far removed from their usual haunts in this country. The three pupæ were the largest I have ever seen, showing that the locality and food-plant were favourable to their development. I may add that, so far as I could learn, they had not been intentionally introduced to the locality.—A. B. FARN; Dartford.

LYCÆNA CORYDON AT HASTINGS.—There being no chalk here, or at all near the neighbourhood, I was surprised at having taken last month (August) a very perfect specimen of *L. Corydon*, a female. It was taken in a small waste slip of land, nearly two miles from the sea. I was also successful in securing in the same place a fine hermaphrodite of *L. Alexis*.—ROSA M. SOTHEY; Sunnyside, Hastings.

[*L. Corydon* is to be seen in Switzerland by hundreds together; as is well known, there is no chalk.—ED.]

COLIAS EDUSA IN LONDON.—During the present week I have seen several specimens of *C. Edusa* in the gardens on the Thames Embankment, near Charing Cross.—A. H. JONES; Shrublands, Eltham, August 17, 1877.

COLIAS EDUSA IN LONDON.—This morning I have seen two beautiful specimens of *C. Edusa*; one in a street leading out of the Tottenham Court Road, and another in the neighbourhood of Russell Square.—H. C. LANG; 41, Berners Street, W., August 18, 1877.

COLIAS EDUSA var. HELICE.—During this August I have obtained, from amongst upwards of twelve hundred *C. Edusa*, fifteen of the variety *Helice*, one very rich cream-colour, with no spots in the margin, which is completely black.—THOMAS EEDLE; 40, Goldsmith's Row, Hackney Road, Aug. 20, 1877.

ACHERONTIA ATROPOS AT WELBECK ABBEY.—A fine specimen of this moth was taken here in the evening of May 29th, while sitting on a wall, apparently at rest. I arrived on the spot a few minutes after it was taken, and identified it, as the fortunate captor of the insect had no idea what it was. While imprisoned in his pocket-handkerchief it several times uttered its plaintive cry.—R. A. ROLFE; Welbeck Abbey Gardens, Worksop, Nottinghamshire.

CHÆROCAMPA CELERIO AT SOUTHSEA.—I have pleasure in

recording the capture of a specimen of *Cherocampa Celerio* at Southsea, by a friend of mine, in August last. It flew into a room, in which he secured it; but having commenced collecting very lately he somewhat spoiled it in setting. The specimen is now in my possession.—P. LOWREY; 61, Hackford Road, North Brixton, September 4, 1877.

SPHINX CONVULVULI AT IPSWICH.—A specimen of *Sphinx convulvuli* was brought to me in fair condition, caught here on September 16th.—A. E. A. JACKSON; 22, Anglesea Road, Ipswich, September 18, 1877.

ACRONYCTA ALNI AT DERBY.—On September 1st I had a larva of *Acronycta alni* brought to me, which was found feeding on a pear tree. It continued feeding on pear until September 10th, when it commenced spinning up amongst some leaves.—G. BAKER; Kedleston Street, Derby.

ACRONYCTA ALNI AT WAKEFIELD.—On August 23rd I had the good fortune to capture a larva of *Acronycta alni* in Haw Park, near Wakefield, Yorkshire. This species has not been taken since 1874, when one was found by Mr. H. Sims, of Wakefield.—T. H. TAYLOR; Wakefield.

ACRONYCTA ALNI AT BURTON-ON-TRENT.—I have to-day taken a fine larva of *Acronycta alni*. It was travelling across a walk leading from my house into the town, and shaded by an avenue of horse-chestnut trees. There is a hawthorn hedge, however, not far off.—[Rev.] CHAS. F. THORNEWILL; Burton-on-Trent, August 29, 1877.

ACRONYCTA ALNI NEAR BIRMINGHAM.—I have to record the capture of an apparently full-fed larva of *Acronycta alni*, taken by myself, at Handsworth, on September 5th. Having doubts about getting an imago, as I could not get it to feed, I gave it some soft turf, in which it has since spun, and is now a pupa.—C. H. PERRINS; Westminster Road, Birmingham, September 12, 1877.

ACRONYCTA ALNI IN HEREFORDSHIRE.—I found a larva of *Acronycta alni* at Pontrilas, Herefordshire, August 16th, on an apple tree. It is now looking healthy, and feeding upon alder and hawthorn.—W. EDWARDS; Malvern.

EMMELESIA UNIFASCIATA NEAR CAMBRIDGE.—I captured two fine specimens of *Emmelesia unifasciata* here this evening at light. Curiously enough I captured two on the same evening last year. I believe this species has not before

been taken in the county.—A. THURNALL; Whittlesford, near Cambridge, August 10, 1877.

LEUCANIA ALBIPUNCTA AT DEAL.—I took two specimens of this rare British *Noctua* at sugar in the above locality, on the night of August 26th.—R. MELDOLA.

XYLOMIGES CONSPICILLARIS AT MALVERN.—I was fortunate in breeding six fine specimens of this rare *Noctua*, from pupæ dug at elm trees, last autumn. The first emerged March 12th; the sixth, April 19th.—W. EDWARDS; Malvern.

XYLOMIGES CONSPICILLARIS.—A fine specimen of *X. conspicillaris* was taken off a fence near Brentwood, Essex, on Whit Monday, May 21st, by Mr. Richards, of Bow.—D. PRATT; Hon. Sec., East London Entomological Society.

CANTHARIS VESICATORIA.—On the 2nd of July I had a live specimen of *C. vesicatoria* given to me, which was found in a garden at Norwich.—R. LADDIMAN; Upper Hellesdon, Norwich.

ABUNDANCE OF SCOPARIA CEMBRALIS.—During the past month *S. cembralis* has been most abundant in two small fields adjoining my garden and house. One of the fields is full of weeds and wild plants, and in it *S. cembralis* last night abounded. At dusk, when they began to fly, the sky was very cloudy and the atmosphere close; consequently the moths flew slowly, close to the ground, and were constantly settling on the grass and weeds. It is no exaggeration to say there were hundreds, probably thousands; and large numbers might have been netted in a few minutes. *Crambus culmellus* and *C. tristellus* were flying with them. It may be worth noting, too, that I have taken a few of Dr F. Buchanan White's variety *Scotica* amongst them.—GEO. T. PORRITT; Highroyd House, Huddersfield, August 18, 1877.

RARE LEPIDOPTERA ON THE SOUTH COAST.—I have had a very successful excursion during the past month of August on the south-east coast of Kent. I took personally the following rare or interesting species, viz.—two *Mecyna polygonalis*, two *Margarodes unionalis*, one *Sterrhia sacraria*, one *Laphygma exigua* (also doubtful second example), one *Leucania albipuncta*, two *Heliothis peltigera*, one *H. armigera* (female, I got a few eggs from this specimen), *Lithosia pygmæola*, *Spilodes sticticalis*, and *S. palealis*. *Colias Edusa* swarmed to a degree I never before witnessed; the variety

Helice was not uncommon; but curiously I did not see *Colias Hyale*, nor could I learn that any had been observed on that coast. The larva of *Acherontia Atropos* was common in the district. I think I did moderately well, but I worked hard.—W. H. TUGWELL; 3, Lewisham Road, Greenwich, September 6, 1877.

CAPTURES IN NORTH WALES.—I have been endeavouring, whilst in North Wales, to discover the larva of *Ennychia octomaculalis*, but have signally failed. Capturing some forty or fifty imagos, males and females, I placed them together in a box for the purpose of breeding, but not a solitary couple could I find *in cop*. They all died without ovipositing. After seven o'clock p.m., at Rhyl, and in almost exactly one spot, I captured eighteen specimens of *Pyrameis cardui*, their battered condition indicating hibernation. At Llanrwst, *Abraxas ulmata* swarmed; and in the pretty vale of Ffestiniog I could have netted hundreds of *Argynnis Selene*, *Hesperia sylvanus*, and *Thecla rubi*; *Thanaos tages* was very common; and I also took *Vanessa polychloros*, *Venusia cambricaria*, *Macroglossa stellatarum*, *Venilia maculata*, *Selenia illunaria*, &c.—S. D. BAIRSTOW; Woodland Mount, Huddersfield, July 9, 1877.

CAPTURES NEAR GATESHEAD.—During the season of 1876 I captured:—May 21st, one *Selenia lunaria*, two *Cidaria siluceata*, at Thornley Dean; July 15th, a black variety of *Xylophasia polyodon*, a fine *Geometra papilionaria*, and a female *Pericallia syringaria*. I also bred a fine specimen of *Cymatophora ridens*, from a larva taken at Gibside. The latter two species are, I believe, hitherto unrecorded from this county (Durham).—THOS. H. HEDWORTH; Dunston, Gateshead-on-Tyne.

CAPTURES AT WITHERSLACK.—My friend Mr. Threlfall and I had a day and a half collecting recently at Witherslack. Although the weather was rough and stormy, I took in sheltered corners *Coleophora Wilkinsoni*, *C. limosipennella*, *C. therinella*, *Plutella annulatella*, *Coleophora pyrrhulipennella*, *C. Fabriciella*, *C. alcyonipennella*, *Parasia neuropterella*, *Catoptria expallidana*, *C. scopoliana*, *Eupithecia luriciata*, *E. constrictata*, *Macaria alternata*; larvæ of *Depressaria capreolella* and *carduella*; *Phoxopteryx siculana*, *P. biarcuana*, *Lithosia mesomella*, *Dicrorampha*

consortana, *D. acuminatana*, *D. herbosana*, *Gelechia dodecella*, *G. senectella*, *Pterophorus tetradactylus*, *P. Bertramii*, *P. plagiodactylus*; and many other species. On arrival home I found a hundred or more moths out, including quite twenty *Rodophæa marmorella*, and best of all the *Cidaria reticulata*, already recorded.—J. B. HODGKINSON; 15, Spring Bank, Preston, July 11, 1877.

CAPTURES AT SHERWOOD FOREST.—Mr. George Dennis and I spent a week in Sherwood Forest this autumn, where we took a number of *Euperia fulvago*, but they were rather worn in most instances. *Crambus pinetellus*, *C. inquinatellus* and *Scoparia truncicolalis*, were numerous and fine. Mr. Dennis took two *Sesia cynipiformis*, which were apparently just out of pupæ. Amongst a number of other larvæ I took specimens of *Acronycta alni* and *Stauropus fagi*, both of which were nearly full fed. Larvæ generally were scarce, and the weather was wet. This was not up to the average of a season at Sherwood.—C. W. SIMMONS; 16, Blossom Street, York.

ON THE REARING CIDARIA IMMANATA.—No one need be surprised at the deep interest taken by the late Mr. Henry Doubleday in rearing this species from the egg on account of its beauty and great variation. It is met with rather freely in some of the woods here; so during last August (1876) I collected all the female specimens I could to obtain a goodly supply of eggs. I adopted the method advised by the late Mr. Doubleday, of placing a strawberry plant in a large flower-pot saucer, and covering it with a framework of gauze to the height of nine inches, so as to form a kind of breeding-cage. I placed therein the leaves on which the eggs were deposited, leaving the cage in the garden during the winter, exposed to all kinds of weather. Mr. Doubleday always maintained that if the eggs were kept in-doors they invariably dried up. This I cannot confirm, but hope to do so next winter. Towards the end of March and beginning of April the eggs began to hatch: I then collected the young larvæ and fed them in-doors. It is a very rapid feeder, for in the space of three or four weeks many attained the pupa state; and on the 28th of May the moths began to appear. I believe it is generally known that there is but one brood of *Cidaria immanata*, which appears towards the end of July

and in August; whereas its allied species, *Cidaria russata*, is out in May and again in July, lasting with a succession of broods until December; while *Cidaria immanata* seldom lasts more than a month from its first appearance. Many collectors even now confound the two species; but if they would take the trouble to rear the two from eggs they would soon see the distinction, and be amply rewarded.—F. O. STANDISH; Cheltenham, June 16, 1877.

CURIOUS FOOD-PLANT OF NYSSIA ZONARIA.—I have succeeded this year in rearing, as far as the pupa state, a brood of *N. zonaria*, hatched from eggs sent to me by a correspondent at Birkenhead. They have been fed regularly on the common yarrow (*Achillea millefolium*); but during my absence from home in June, a young friend, whose botanical knowledge is somewhat limited, treated them to a dose of the garden plant known as “old man” or “southernwood,” a species of *Artemisia*, and, strange to say, they ate it as readily as their proper food. Perhaps it may be discovered that such an event is not wholly without parallel in a state of nature. I should say that I tried my larvæ at first with sallow, but they would not eat it all, while they took to the yarrow at once.—[Rev.] C. F. THORNEWILL; Burton-on-Trent, August 1, 1877.

PARASITES ON LARVA OF BOMBYX RUBI.—About a fortnight since I picked up on the hill-side a half-grown caterpillar of *Bombyx rubi* (the fox moth), which is abundant in this neighbourhood, but this particular one attracted my attention, inasmuch as it had several pale brownish cocoons of a species of ichneumon attached to the hairs of its back and sides, not in a cluster, but each separate, and standing at right angles to the body. The larva did not seem any the worse for these parasites; and I question very much whether they properly belonged to it. I have this morning, August 21st, hatched three or four of the flies, and should like to know what they are—probably a *Microgaster*?—V. R. PERKINS; Wotton-under-Edge.

PRESERVATION OF LARVÆ BY INFLATION.—The exhaustive paper on this subject in the September number of the ‘Entomologist’ (Entom. x. 225) leaves little to be added; and my only object in writing is to say that those who do not care to be at the trouble of making the “pressure-bottle,” so

well described, will find an excellent substitute, and probably a much handier instrument, in one of "Clarke's spray producers." This is what I always use, and it was first suggested to me by Lord Walsingham, who had used it for some time previously. It is an instrument used by medical men and others, and is the same in principle as the "pressure-bottle," being simply an india-rubber tube, having two balls, one at the end, in which is a valve, which on being squeezed with the hand distends the other ball about the middle of the tube, and keeps up a constant current of air, strong or weak, according to the rapidity of the pressure on the end ball. It is very simple, and thoroughly efficient; and may be obtained of any druggist, or dealer in surgical instruments, for five or six shillings.—GEO. T. PORRITT; Highroyd House, Huddersfield, September 7, 1877.

NOTES ON PUPA-DIGGING.—Not many readers of the 'Entomologist' perhaps are systematic pupa-diggers. A collector may begin to dig for pupæ with sanguine hopes of success, soon, however, to be dispelled by a few hard clods and empty pupa-cases; still those who persevere in digging can scarcely fail, sooner or later, of some measure of success. Mr. H. Benson and I have found digging by no means a failure. Last year we dug up two pupæ of *Cymatophora ocularis*, both of which reached the imago state; pupæ of *Notodonta dictæa*, *Scopelosoma satellitia*, *Amphydasis betularia*, about twenty *Pygæra bucephala*, and sixty *Tæniocampa instabilis*; also a few *T. stabilis*, *T. cruda*, *T. gothica*, *Nyssia hispidaria*, and *Hybernina progemma*; we found about twelve pupæ of *Mamestra brassicæ*, one *Arctia mendica*, twenty *Smerinthus populi*, thirty *S. tiliæ*, and about two hundred *Sesia apiformis*. Off trees we took two pupæ of *Dicranura vinula*, and from under the bark of trees two pupæ of *D. bifida*, one of which became an imago, and a considerable number of *Acronycta megacephala*. In the roots of willows we found some pupæ of *Sesia bembeciformis*, of which six turned into perfect insects. We have found a small trowel to be on the whole the best implement to use, a pupa-digger having the disadvantage of maiming most of the pupæ it happens to touch, though it is most useful in pulling away the grass round trees. A bark-ripper is objectionable on the ground of the havoc it makes with trees; yet it can be

used to advantage for breaking off small pieces of bark.—A. E. HUNTER and H. BENSON; Jesus College, Cambridge, August 25, 1877.

NAPHTHALINE FOR KILLING MITES.—In common, I expect, with many other of the readers of the 'Entomologist' for April (Entom. x. 104), I was delighted to see that naphthaline was so sure and speedy a mite destroyer. Immediately purchasing a bottle, I placed some of the unpleasant-smelling crystals in my collection; and at the same time, to test its efficacy, half filled a pill-box with it, and imprisoning two small beetles, a fly, and a caterpillar in the box, left them to their fate. An hour afterwards they were as lively as ever, next day they were still more lively, and the day after the beetles ate the caterpillar. Why was not the naphthaline fatal to them?—E. K. ROBINSON.

CENTIPEDE DEVOURING A MOTH.—While sugaring near Taunton, on the evening of September 15th, I rescued a specimen of *Agrotis saucia* from the clutches of a centipede, which had surprised and was greedily devouring it. It was only with some difficulty that I persuaded the destroyer to let go his victim.—[Rev.] C. F. THORNEWILL; The Soho, Burton-on-Trent.

ENTOMOLOGICAL SOCIETY OF LONDON.

August 1st, 1877.—J. W. DUNNING, Esq., M.A., F.L.S., Vice-President, in the chair.

Mr. Stevens exhibited specimens of *Teretrius picipes* (Fab.), one of the *Histeridæ*, which he had taken on the same fence, at Norwood, on which he had previously taken *Tillus unifasciatus*. He also remarked on the appearance in his neighbourhood of a second brood of *Colias Edusa*, several specimens having been observed by him, all of which were males.

Mr. Smith exhibited, on behalf of Dr. Bennett, of Sydney, who was present at the meeting, a fine pair of the beautiful and rare beetle *Eupholus Bennettii* (Gestro), from Yule Island, New Guinea. It had been described under that name in the 'Annali di Museo Civico di Genova,' viii., 1876.

The Secretary exhibited a specimen of an insect which had been forwarded to him by Mr. Bewicke Blackburn, who

stated that a large field of mangolds belonging to the Knight of Kerry, in the Island of Valentia, had been totally destroyed by it. The specimen was examined by several of the members, who agreed that it was the larva of a coleopterous insect, but in consequence of its imperfect condition it could not be determined.

Mr. Douglas, who was unable to be present at the meeting, had forwarded to Mr. Jenner Weir a letter he had received from Mr. R. A. Ogilvie, enclosing specimens of an insect found in great quantities in a jar of pickles (piccalilly). They confined their attacks to the pieces of cauliflower in the jar, which they appeared to relish, notwithstanding the vinegar, mustard, pepper, &c., in the pickles. The specimens had been submitted to Professor Westwood, who replied that "the flies were the common *Drosophila cellaris*, with their curious two-horned pupæ; and they frequent cellars and cupboards, delighting in stale beer, wine, &c." He supposed that "the cauliflowers were more to their taste than the other things in the jar, being more succulent and flabby." In answer to a question put by Mr. Ogilvie, he said that the eggs were laid in the pickle-jar, and not in the vegetables before they were pickled.

Mr. Douglas also forwarded a letter he had received from Mr. A. H. Swinton, of Guildford, enclosing a specimen of *Myrmica ruginodis*, which, on being placed under a wine-glass, stationed itself at the rim, head downwards, and rapidly vibrating the abdomen, continued "an intense noise," resembling the spiracular piping of the Dipteron, *Syritta pipiens*.

Mr. Enock remarked, with reference to a spider which had been exhibited by Sir Sidney Saunders at a previous meeting as *Atypus Sulzeri*, that he had taken the specimen himself at Hampstead, and that he had since referred it to the Rev. O. Pickard-Cambridge, who stated that the insect was certainly not *A. Sulzeri*, but that he considered it to be *A. Beckii* (Cambridge), which would probably be found to be the same as *A. piceus* (Thorell), though he was not certain, as the only female which he had of that species was too much damaged to admit of any satisfactory comparison. The type of *A. Beckii* was an adult male given to him by the late Richard Beck, who was uncertain of the locality, though Mr. Cambridge

appeared to think it probable that he had got it from Hampstead, as he often collected there. The example sent to him by Mr. Enock was different from the Isle of Wight species, of which he had several female specimens, but no males, though he believed them to be *A. Sulzeri*. He would be very glad if collectors in the Hampstead locality would look out for the males in the autumn and winter, as if he could obtain that sex it would enable him to put the question, as to species, at rest.

Mr. Enock exhibited a bottle containing a great number of larvæ of *Cossus ligniperda*, which he had found in a portion of a small willow. He had taken sixty-six larvæ out of a piece of wood four feet long.

Mr. Dunning again directed the attention of members to the exhibition by Mr. J. Jenner Weir, at the last meeting, of a female specimen of *Cicada montana*, which was reported to have been distinctly heard to stridulate, notwithstanding that the insect was a female, and also that the species was one of which even the males were not previously known to stridulate. Mr. Weir stated that since the last meeting he had again been to the New Forest, and had seen, in the possession of Mr. James Gulliver, of Ramnor, near Brockenhurst, two specimens of *Cicada montana*, and he was assured by Mr. Gulliver that the stridulation of the insect was well known to him, and that he was guided by the sound so made in effecting the capture. Mr. Champion said that he himself had captured the insect, and had distinctly heard a loud noise, but whether the sound was caused by the males or females he could not say. Mr. Dunning considered that further evidence was wanting to prove stridulation in the females.

REVIEWS.

Manuscript Notes from my Journal; or, Illustrations of Insects, Native and Foreign. Order—Hemiptera. Suborder—Heteroptera, or Plant-bugs. By TOWNEND GLOVER, Washington, D.C., 1876; pp. 132; 4to.

IN many respects this is rather a singular work. Mr. Glover seems endowed with an unusual talent for collecting and arranging notes upon the various orders of insects, and desirous of making useful to others the result of his labours,

and yet at the same time unwilling to go to the cost of printing his notes, he has adopted the plan of transcribing them on lithographic paper, illustrating them with original etchings on copper, hand-colouring the same, and issuing a limited edition of fifty or sixty copies, which he distributes to such societies, &c., as are likely to make most use of them. All this the author accomplishes in his leisure hours; and, whatever value his labours may have, we cannot but admire his industry.

In the absence of any synopsis of the North American *Heteroptera*, we can well imagine the work before us proving of considerable utility to the young student. Space will not permit us to allude at any great length to the contents of the book; but we may mention that amongst others it contains notices of the various classifications that have been adopted; lists of the predaceous, parasitic and injurious species; of the insects that destroy *Hemiptera*; of the various remedies against injurious species; notes of the habits and food; &c.

In the present notoriety of the Colorado potato-beetle, it may be of interest to note that in America the following species of *Heteroptera* are said to destroy it:—*Podisus cynicus*, *P. spinosus*, *Milgas cinctus*, *Perillus circumcinctus*, *Sinea multispinosa*, *Stiretrus fimbriatus*, and, probably in the egg-state, *Lygus lineolaris*. It is not unlikely, then, that in the very improbable circumstance of its becoming established in this country, some of our native *Hemiptera* may attack it.

The work is illustrated by ten plates, etched and coloured by the author. The figures (whose colour is perhaps a trifle feeble) will prove of great service in carrying out the purpose of the book.—F. B. W.

The Colorado Potato-Beetle. Illustrated and described by Dr. ANDREW WILSON. W. & A. K. Johnston: Edinburgh and London, 1877.

WE cannot speak too highly of this pamphlet, whether with regard to the beautiful coloured plates illustrating the life-history of *Doryphora decemlineata*, including some of its fatal parasites, or of the pleasant but instructive way in which Dr. Wilson tells us all about this insect from its first discovery in 1824, and the record in the third volume of the Proceedings of the Academy of Natural Sciences of Philadelphia, down to

the present time, when its name has become a terror to the American potato-growers. Following this historical sketch, Dr. Wilson popularly defines what a beetle is, and then shows the place of the Colorado amongst beetles. In the same popular manner the author goes on to describe the habits and various stages of the insect, and compares it with the "Bogus potato-bug," which is figured for comparison. Lastly, he treats his subject from an economical point of view, and describes the damage done by this insect, and the remedies which have been successful or otherwise. As we finish reading this little work we cannot help wishing there were more to follow, and that the author had extended his labours a little further, for the reader's interest is kept up to the last. We would especially recommend our agricultural readers who are interested in the subject to purchase the pamphlet.

DEATH OF WILLIAM ARNOLD LEWIS.—We regret to have to record the death of Mr. W. Arnold Lewis, who with his companion Mr. Noel Paterson and three guides lost their lives in the fatal accident on the Lyskamm, on September 6th. Mr. Lewis was educated at Harrow; and after practising for a short time as a special pleader was called to the bar in 1869. Such time as he could spare from his professional engagements he devoted to Entomology, in the study and pursuit of which he displayed a zeal and energy which sometimes led him into conflict with those whose tenets clashed with his. The *Lepidoptera* were his favourite group; and he chiefly distinguished himself by his opposition to the constant alterations in the nomenclature of the order. His papers on that subject, read before the Entomological Society and the British Association, showed a fund of knowledge and a power of reasoning and vigorous expression, which, if they failed to convince, commanded the admiration of all his opponents. Mr. Lewis was elected a member of the Entomological Society in 1869, and a fellow of the Linnean Society in 1872. His remains lie buried at Zermatt. All who knew him well, and especially those who ever joined him in his entomological excursions, will deplore the sad catastrophe which terminated his life at the early age of thirty.

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VARIETY OF ARGE GALATHEA.

By J. PLATT BARRETT.



ARGE GALATHEA (VARIETY).

THIS variety was captured by myself on the 23rd of July, 1875, in the immediate vicinity of Gravesend, Kent. The variation consists of a diminution of the central black markings, and of the white markings in the hind margins. The large black blotch extending from the costa to the middle of the fore wings, and a blotch of similar character in the hind wings, are entirely absent, while the usual white spots in the hind margins have almost disappeared. This gives to the specimen the appearance of having a black border; but the peculiarity was not very striking until the insect was set out.

34, Radnor Street, Peckham, S.E.

ON THE HABITS OF EAST INDIAN INSECTS,
ESPECIALLY LEPIDOPTERA.

By M. C. PIEPERS. Translated from the Proceedings of the Dutch
Entomological Society, vol. xix., by

W. F. KIRBY.*

WHEN I collected our indigenous butterflies in the neighbourhood of Arnhem, many years ago, I observed that several of the largest and finest species frequented the neighbourhood of clear running water. I considered the brooks on the estate of Mariendaal a good hunting-ground, for I had already found so many fine specimens there that I always directed my steps thither again, sure that sooner or later I should again make some good capture.

When, ten years later, I again took up the butterfly-net in the East Indian Islands, the same thing happened to me there also; only, as one who is accustomed to tropical climates would expect to find, on a much larger scale than in temperate regions. In these islands—where the clear mountain streams rush foaming over masses of rock, especially where the rivers flow swiftest and purest, down waterfalls, or near water broken by irregularities of the bed—the haunts of the great butterflies are to be found, and there can one feel sure, when there is no want of sunshine, of seeing himself surrounded by many forms of these children of the sun, whose number and beautiful colours would amaze the Northern collector. I say amaze; but his eye and mind would alike be ravished with the possession of the beauties of Nature, for nowhere does tropical nature show itself more dazzling than here, where in the twilight formed by the over-arching of the incredibly luxuriant tropical vegetation, due to the heat and damp, the mountain stream, in the fierce glare of the sun, rushes swiftly down like a broad, shining silver streak, breaking through the darker hues of the bank, foaming and dashing spray over every rock in its path, which is covered at every turn with drops of water, illumined by the sun into glittering jewels: while above and between, in perfect harmony with that life,

* A German translation, by Dohrn, of the greater portion of this paper, has been published in the 'Stettiner Entomologische Zeitung;' and I have sometimes checked my own translation by it.—W. F. K.

splendour, and beauty of colour, the richly ornamented flying flowers, which we call butterflies, flit to and fro.

Why do we find butterflies prefer such places? It is perhaps because they are, if I may so express it, of a thirsty nature—and this although they prefer the very hottest sunshine, and even seem to find it so necessary, that if the sun is only clouded over for a minute they settle as soon as possible; and if the sun should not shine—in the case of some individuals even if it should not be shining very strongly—never leave their hiding-place the whole day. I have seen some striking examples of this, one of which has, I think, never been recorded, and seems at first sight altogether to conflict with the idea that one is accustomed to form of the habits of butterflies. Even in the Netherlands we may occasionally see butterflies alight on damp sand, on which the sun is shining, to suck up moisture from the ground; but if, in the East Indian Islands, we walk along the sandy or gravelly bank of a mountain stream, or along the bed of a nearly dry stream composed of similar materials, during the hottest part of the day, we shall disturb butterflies at almost every step, especially *Papilionidæ* and *Pieridæ*, which sit there on the damp ground to refresh themselves with visible pleasure, but with wings closed so that they are scarcely discernible; and you suddenly see swarms of such butterflies fluttering up into the air from before your feet. I was once travelling in South-west Celebes, when my companion suddenly exclaimed as we were crossing a nearly dry brook, "Oh, look what a beautiful flower!" And on looking where he pointed I saw in the bed of the stream amongst the damp gravel a beautiful orange-coloured flower with a white centre, about ten centimetres in diameter. The strangeness of the occurrence led me to step nearer in order to observe it more closely, when what did I see?—the flower consisted of two concentric rings of butterflies (*Callidryas Scylla*, Linn.), which had closed their wings (which are yellow, and orange beneath), and were busily sucking up the moisture from the damp sand, and thus represented in the most closely deceptive manner the petals of a flower. They surrounded five of another white species of *Pieris* similarly occupied, which thus seemed to form the white centre of the flower. I still remember the amazement

of my travelling companion, when on my nearer approach the whole flower dissolved into a swarm of butterflies.

I afterwards saw another beautiful flower of the same kind, in which the petals were composed of a number of the red *Pieris Zarinda*, along with some yellow and white *Pieridæ*, in another part of South-west Celebes, in one of the above-mentioned places, where butterflies, especially *Papilionidæ* and *Pieridæ*, love to resort, just above the beautiful waterfall of Maros, which Wallace has described; and I saw there at the same time something which I never saw before or afterwards, and had never heard or read of before,—for there I saw a butterfly bathing.

While I stood on the bank of the river, which forms at this spot an apparently still and very clear pool before entering the cleft in the rock, from which it reappears as a foaming and thundering waterfall, a specimen of *Papilio Helenus*, Linn., came flying over the water. Flying low, as is the habit of this species, it came within a short distance of me, when I saw it suddenly half-close its wings and dive down close beside me, so that the whole body and about a third of the wings, which slanted upwards, were immersed; it then raised itself again out of the water and flew away. We cannot require stronger proof of the necessity of moisture to an insect which seems so little fitted for contact with water.

Just as some plants in the East Indies choose the driest localities parched up by the burning sun, so do some butterflies select similar spots,—such, for instance, as *Junonia Orithya*, Linn.,—and without needing rest enjoy settling on the scorching hot sand. And like other plants which choose very damp and deeply shaded localities in the forest, where no ray of sunlight can penetrate, some *Satyridæ* and other butterflies, usually of dark colours, love to haunt these dark and dripping nooks. Again, as the most beautiful and vigorous tropical vegetation is developed where the fiery heat of the sun is coupled with great dampness, so do the largest and most brilliant butterflies delight to frequent such places, where they rejoice in the sunshine, and have also the dampness which they so much need. It is worth mentioning that among these last butterflies this is not due, as in other insects, to the peculiarity of their habits and surroundings, but the explanation is to be found either in

the food of the perfect insect or in its care for its offspring. So that it seems as if the nature of the larvæ which live on plants growing in warm and damp places, and on which the peculiarity of the nourishment does not seem to be without influence, also remains with the perfect insect, although it is no longer useful to it.

At the same waterfall of Maros I witnessed another proceeding among butterflies, which I think worth mentioning. It is known that male butterflies, like most other animals, fight with each other from jealousy; but in other respects these insects are to be considered, as far as I know, very peaceable, and by no means quarrelsome creatures. I was, therefore, much astonished to observe the following incident:—Around and over the blossoms of a flowering shrub flew several butterflies (*Precis Iphita*, Linn., and some *Pieridæ*), when a butterfly of gigantic size, in comparison with them, *Papilio Remus*, Cram., came flying, apparently with the object of sharing their repast. Whether the others were desirous of the company of a guest among them whose appetite would be enormous, or not, it is certain that I saw them attack the *P. Remus*, drive it away, and pursue it for a short distance, till it was evident that it had really taken to flight, when they returned to their flowers. I have often seen swallows and other small birds drive away and pursue birds of prey which showed themselves in the neighbourhood of their nests, in a precisely similar manner: they fly above the great enemy, and suddenly drop down upon him, or peck him, till he tires of the rapid and repeated attacks (against which his size and consequent lesser rapidity of flight hinder him from defending himself), and is forced to seek safety in flight, when his little enemies do not neglect to pursue him for a short distance. This reminds me that I have also read of similar attacks of humming-birds upon American Sphinges, arising from jealousy about their food; but in the present instance the assailants and victors were not birds provided with sharp-pointed beaks, but apparently defenceless butterflies.

Is it, then; perhaps, throughout the insect world, "everyone for himself;" and are so many of the lovely, winged, beautifully-clothed creatures, apparently so mild and defenceless, really vicious? It cannot be denied

that this very rational behaviour leads us to think that butterflies have more understanding than is generally supposed. I think the following incident will show that they are not deficient in memory:—One evening I saw, in the open verandah of the Harmonic Society, at Manghasar, a specimen of a butterfly which is very common there, *Precis Iphita*, Linn. Notwithstanding the very strong illumination, this little creature remained sitting quietly in the same place on the ceiling during the whole evening. When I came to the Society next day I did not see it; but in the evening it was again sitting quietly in the same place. And as civilisation has not advanced so far in Manghasar that it is there considered necessary mercilessly to destroy or drive away every harmless creature which ventures into or near a human dwelling, I had the pleasure of admiring the memory of this *P. Iphita* for six days. It was not to be found in the daytime, and was then probably absent on business; but every evening, for six consecutive evenings, I found it return faithfully to the same sleeping-place. Then some accident probably befel it, for I never saw any trace of it again.

I do not know whether all butterflies return to the same sleeping-place so regularly; but I have the following observations to record on the sleeping-places of the *Lycænidæ* and of the *Micro-Lepidoptera*. When you go into an Indian forest at daybreak, while the grass and low-growing plants are still quite wet with the night's dew, you see *Micro-Lepidoptera* sitting everywhere on the tops of the plants. As soon as the rays of the sun begin to make themselves felt, which quickly happens, and dry up the plants, the little animals creep slowly down the stalks, and hide themselves in the moss and among the roots of the plants to pass their day's sleep in stillness and darkness. An hour after sunrise there is not a trace of them to be seen. The *Lycænidæ*, however, which are day-flyers, do just the opposite at this time. As soon as the sun begins to make itself well felt they creep slowly up along the stalks of the low plants; and when they have basked for a long time on the top in the warm sunlight they fly away. The influence of the warmth of the sun on the flight of butterflies may also be noticed from the circumstance that in the Netherlands very few butterflies are seen on the wing before eight o'clock in the morning, even during the

longest summer days, and those which love great heat—such for instance as the *Lycænidæ*—do not appear in daylight till some time later; whereas in the East Indies the butterfly world is already in full movement by a good hour after sunrise.

When Linnæus made his classification of animals, he established among *Lepidoptera* a class of twilight-flyers, or *Crepuscularia*. Independently of the fact that other and better principles of classification have subsequently been employed, it was soon observed that the so-called twilight-flyers are really true night-moths, which fly during the whole night, and not at morning and evening twilight only. But in the East Indies we meet with true twilight-flyers, which do not belong to the genus *Sphinx*, which Linnæus considered such, but to the great group of *Rhopalocera*. The sun has scarcely set before we see everywhere, both in Java and Celebes, numbers of the common *Cyllo Leda*, *Amathusia Phidippus*, and *Casyopa Thrax*, Linn., and in Celebes, *Debis Europa*, Fabr., also, but I never saw these species wandering about at night in the moonlight, or entering lighted rooms, like the true night-moths, which are very numerous, although like the latter they sit still and repose all day, and if disturbed only fly a little way, and settle again directly. I have also seen the commonest of these butterflies, *Cyllo Leda*, flying in abundance in the morning twilight; and I once observed the same with *Debis Europa*. Moreover, I suspect from the exactly similar behaviour of different species of *Mycæstis*, and of *Elymnias Lais*, Cram., in the daytime, that these should also be included among the twilight-flyers in Java.

In every country with which I am acquainted it is well known that many *Lepidoptera* are very injurious in the larva state, but the perfect insect is considered everywhere to be harmless. I must tell the truth about this, as I have already about their gentleness, and attack their reputation on this point also. In South-west Celebes a small white moth, an undescribed species of *Scirpophaga*, is one of the pests of the country. These moths fly into lighted rooms in the evening in incredible swarms, settle upon everything, including the inmates; and where they touch the naked skin they leave an intolerable itching behind. Besides, they dirty the white walls of the rooms everywhere, by firmly attaching to them quantities of eggs covered with yellow down.

I now turn to caterpillars. I have often been surprised that in the East Indies, where there is so great a variety of butterflies, so few caterpillars should be met with. My observations lead me to think that this is to be ascribed to the circumstance that probably a large portion of the Indian larvæ, as is the case with some in the temperate zones, avoid the light and heat of the day in the ground, and only visit the plants on which they feed at night; besides, as is also the case with tropical as compared with temperate plants, very few seem to be gregarious; at least I never found a great number of larvæ together, except those of *Bombyx Waringi*, Teysm., a quantity of whose larvæ I once met with on a young *Ficus Benjaminea*, Linn.

Among the larvæ which I had an opportunity of observing I noticed the important fact, long known in Europe, that some species seem to desert the plants on which their species originally fed for imported plants; just as in the Netherlands the larvæ of *Acherontia Atropos*, Linn., now seems to live by preference on the potato plant, which was introduced from America, and cannot be excluded from it, so we find the very common larva of the equally common butterfly, *Papilio Agamemnon*, Linn., both in Batavia and South-west Celebes, always feeding on the leaves of *Anona muricata*, Linn., a plant introduced from the West Indies. I also met with the larvæ of *Euplœa Midamus*, Linn., feeding both on an indigenous plant and on the oleander, which was imported from Europe as an ornamental plant; and at Manghasar the larvæ of *Cyllo Leda*, Linn., were not uncommon on the South American pampas-grass, which I grew in my garden for horse-fodder.

Among East Indian larvæ I also observed the peculiar variations and resemblances, perhaps partly explicable by mimicry, but always remarkable, which occur among larvæ themselves, so that some, apparently without any rule, which produce allied butterflies, are very similar, while at other times those of species which resemble each other very closely (such as the European *Acronycta tridens* and *A. psi*), always exhibit a great difference in their larvæ; and, again, other species, which are very distantly related, are produced from larvæ with the closest mutual resemblance. The larvæ of the closely-allied *Papilio Memnon* and *P. Polytes*, Linn., differ

only in size and in their food-plant. The little arrow-head-shaped larva of *Bombyx Waringi*, Teyss., which we have just mentioned, is exactly like a diminutive *Sphinx* larva; the larvæ of the widely separated *Amathusia Phidippus*, Linn., and *Lasiocampa Vishnon*, Guér., though of very peculiar form, differ only in colour and food. Among the larvæ of *L. Vishnon* I once saw something which never occurred to me at any other time: on the whole length of the back some specimens (for this larva varies extremely in colour and markings) showed a beautiful mark, which appeared like a stripe embroidered with white and yellow floss-silk, while there was an abundance of white and yellow hairs along both sides of the larva. Shortly before they changed into pupæ the white and yellow colour, both of the stripe and of the long hair at the sides, changed to violet, without this being due to moulting.

The hairs of the larva of *Miresa nitens*, Walk., figured by Horsfield as *Setora nitens*, presented a still stranger appearance. When I met with this very beautiful larva it was completely covered with so-called spines: I counted eight large and twenty-four small. After a few days it moulted, without seeming to undergo any alteration in its external appearance. A few days later it moulted again; and now I saw the spines changed into tufts of hairs, some of which resembled stiff bristles, and others were more like pencils of hairs. Three days later the hairs of these bristles united again, so that they seemed to form stiff bristles as before the moulting; but three days later the hairs again divided, and the previous shape of bristles and pencils came back. After this the spiny shape did not return, but the same tufts of hairs altered their shape daily, so that one day they resembled bristles, and another pencils. And this continued till the larva became a pupa.

During my residence in the East Indies I busied myself chiefly with *Lepidoptera*, and I cannot therefore say much about insects of other orders. But I cannot refrain from observing, though it is nothing new, how much stronger and more conspicuous insect life appears in the tropics than in temperate climates. The annoying pertinacity of the flies—which always return, however often driven away—is known to every inhabitant of the East Indies; and every

housekeeper knows that no place of security is inaccessible to the innumerable ants. My watch stopped one night; and when I took it to the watch-maker he took a small ant from among the wheels, which had availed itself of the narrow opening left for the spring to work in, to squeeze itself into the watch and taste the fine oil with which the works were lubricated. Almost every evening hundreds of small insects of all orders find their death in every lamp; innumerable *Coleoptera* fly into lighted dwellings, whose nearest relations in the temperate zone also possess wings, but very rarely use them; as well as a harmless but very troublesome *Gryllotalpa*, much dreaded by ladies, which resembles *Sphinx convolvuli* in its reckless flight. Who has not been disturbed at supper-time in the East Indies by swarms of termites suddenly flying in and out? or, still worse, by ill-smelling *Orthoptera*? or the intolerable itching caused by the species of *Lepidoptera* mentioned above? Who has not been compelled, by the ravages of termites or cockroaches in linen chest or library, to utter the socialistic wish that he had no private property? And above all, among those who cannot always remain in the better arranged dwellings of large towns, who does not remember those never-to-be-forgotten Indian nights, in which poets and lovers might have revelled, but when wearied men who wanted sleep were plagued by blood-sucking mosquitoes, crawling ants and other insects, as if by actual demon tormentors?

Let me relate a single night's experience, which may serve as a small contribution to the still unknown life-history of an Indian insect:—One night I was asleep at Batavia, thinking myself well protected by my mosquito-curtain, when I was awakened by a noise. On waking up I heard a buzzing as if my room was turned into a great beehive. My night-light was extinguished, probably by the insects which I heard in my room having flown into it; but a little light from a gas-lamp coming through the window showed me the outside of my white mosquito-curtain covered with insects, which seemed to be some kind of wasps. Of course I had no wish to leave my place of protection; but I soon saw that my mosquito-curtain was not so well closed as I had thought, and that some of the dreaded animals had already discovered

the opening left by my carelessness. The only safety now lay in a determined resolution: I suddenly tore open the curtain, and threw my pillows so that I could jump upon them and reach the door of the room without the danger of stepping with my bare feet on the wasps, which probably covered the floor of the room; and so I got out of it. I then called to my servants to bring a lighted candle. As soon as they saw the animals they declared that they did not sting, and handled them without fear. Thus reassured I went back to my room, and saw that it was filled with insects, which appeared to have come up as full-grown termites from a hole between the stones of the floor. It is clearly the habit of termites to live in the ground in their imperfect condition, and, when perfect, the winged specimens fly away. They thought little of the fitness of time and place when they ruthlessly disturbed my rest. It was nearly an hour and a half before they had all flown out to a light set outside the room to attract them. About a year afterwards the same thing happened in the same room. I sent the insect to the Netherlands—to the Leyden Museum; and it has been determined by Ritsema to be *Dorylus Klugii*, Hagen.

LIFE-HISTORIES OF SAWFLIES.

Translated from the Dutch of Dr. S. C. SNEELLEN VAN VOLLENHOVEN.

By J. W. MAY.

(Continued from vol. ix., p. 251.)

NEMATUS LUGDUNENSIS, Voll.

Nematus niger, antennis nigris, pedibus fulvis cum coxis et linea subtus in femoribus nigris, alarum stigmatibus in mare dilute fusco, in femina flavo, femineo abdomine aurantiaco, fasciis abbreviatis nigris.

It is no less singular than true that this species of *Nematus* is as yet undescribed. The descriptions in Swammerdam ('Bijbel der Natuure,' vol. ii., pp. 723—733, pl. 44, figs. 1—6), in Frisch ('Beschr. von allerley Insecten,' pt. ii., p. 22, pl. 4), in Hartig ('Aderflügler Deutschlands,' vol. i., p. 205), in Stephens ('Illustrations,' vol. vii., p. 36, No. 39, *Gallicola*), in A. Costa ('Fauna del Regno di Napoli,' pt. iii., p. 24,

pl. 65, fig. 3), do not apply to the perfect insect, which in this instance I have reared. The species of insect reared by Redi and Réaumur from willow-galls is uncertain, and it is equally so with regard to the species of *Nematus*, meant by Linnæus under the name of *Tenthredo Gallæ foliorum Salicis*, and by Fallén and Dahlbom under that of *Nematus Saliceti*. Taking all this into consideration I thought it best to give my species a distinct name, in order to avoid all confusion for the future. It is quite clear that there are two species living entirely in the same manner within galls on willow leaves, one of which species was reared by Swammerdam, and perhaps by all the other above-named authors, at all events up to the time of the insect leaving the gall; the other species being the one I am now describing. All the published descriptions of the gall agree with what I have myself observed: this may also be said of the larva, if its more or less green, or gray, or yellow colour is left out of consideration. I cannot say much with certainty respecting the pupa, but in this state the *Hymenoptera* offer few or no specific characteristics, especially in the case of such nearly-allied species as *Saliceti*, *Vallisnerii*, and *Lugdunensis*. The imagos, however, differ greatly in colour, especially the females; and I regard the entirely yellow stigma in that sex as a special characteristic of my species.

I shall endeavour to describe and figure the other species, which, also, according to Swammerdam, occurs in this country, and has been met with by Messieurs Snellen and Wttewaal.

I am not acquainted with the egg; most probably it is like that observed by Swammerdam, of an elliptical shape and semi-transparent.

I found the galls on our common white willow (*Salix alba*) and on the red willow (*Salix purpurea*). They were perfectly alike, projecting on either side of the leaf, smooth, shining, and of a red colour; that on the red willow, however, being generally somewhat larger. When young they are more filled up inside than later, when the parenchyma is almost entirely eaten out by the larva. The gall itself is nothing but a diseased swelling out of the parenchyma of the leaf. I must here especially call attention to the fact that the imagos reared by me all came from galls of *Salix purpurea*.

On the 5th of September, 1869, I took home some galls on leaves of the first-named species of willow, which is here the commoner. I carefully cut one of the smallest into three pieces, and found in it a greenish white larva, scarcely one millimetre long. It appeared to me to have twenty legs; the head was black, and the body wrinkled. The gall was so grown together that there was hardly room for the little animal; fig. 3 was drawn from this specimen. It speaks for itself that this larva soon died. The remaining galls dried up, and I determined to look for others. However, the matter was put off; and the winter came without my having made any further observations.

On the 31st of August of the following year I came across a clump of the red willow on the downs near Noordwijk, having almost all the leaves covered with large pear-shaped galls projecting from either surface: they were pretty well double the size of those of the white willow. I could see that some of the inhabitants had already left their dwellings, as in some cases a little round hole was visible in the gall; fig. 2 represents one of these galls. The larvæ which I found in them differed much in size and age; the larger number, however, were full grown, and these were of the size of fig. 4, that is to say nine millimetres in length. One of these, magnified, is shown at fig. 5. The head was shining black; the body brownish yellow, in some cases with a greenish tinge; in others the head was gray, with black marks on the legs, and having the body more of a gray colour, with a red tinge in the middle, especially on the back. There were in all twenty feet.

This account of the larva differs from the description given by Swammerdam and others, in this—that the later observers describe the full-grown larva as being more green than the young ones, while with me the more advanced larvæ were yellower, or more of a nut-colour.

I placed the willow leaves, which I had collected, in a confectioner's glass, with some mould at the bottom; I had not been able to bring home any whole branches. This prevented my having the opportunity of observing whether the larvæ, as is stated of the described species, bite a hole in the gall when the latter has become filled with excreta, and protrude the anus through the hole for the purpose of

relieving the body. I was only able to note that when they required no more food they escaped by a hole which had been gnawed in the gall, and hid themselves in the mould, where they spun a small oval cocoon of grains of earth. I first observed the imagos in the beginning of May; these were males. The females did not make their appearance till about twelve or fourteen days later. The following is a description of the sexes:—

Male.—Length five millimetres (see fig. 6). Head very broad, with projecting eyes, shining black, wrinkled on the vertex about the three ocelli. Trophi brownish white, apex of the mandibles brown, palpi gray. Antennæ entirely black, nearly as long as the body, moderately thick, and covered with a microscopic pubescence. Thorax shining black, excepting the extremities of the prothoracic lobes and the tegulæ, which are pale brown, and the cenchri, which are of a gray colour. Abdomen conical, with a carenite elevation on the dorsum, shining black, excepting the valve of the anus and generative organs, which are sordid orange (see fig. 8). Wings iridescent, costal nervure and stigma sordid yellow or gray, the other nervures black. Coxæ black; femora reddish yellow, with a black longitudinal line on the under side commencing at the base, but not reaching the apex; tibiæ pale orange, the posterior pair having the apex black (fig. 7); anterior tarsi reddish yellow, with the last two or three joints brown; posterior tarsi black.

Female.—Broader and more robust than the male, so that being of the same length it has the appearance of being shorter (see fig. 9). Head more projecting in front, so that it is more quadrangular; forehead smoother, black. Trophi the same as in the male. Antennæ somewhat shorter and thinner, black, glabrous. Thorax black, with broader orange-coloured extremities of the prothoracic lobes; tegulæ also of the last-named kind; cenchri dark gray, almost black. Wings iridescent, with pale yellow costal and post-costal nervures and stigma, the last named being particularly large; the remaining nervures blackish. Coxæ black, with yellow tips; femora and tibiæ orange, the four anterior femora with a small black longitudinal line underneath; apex of posterior tibiæ brown; three joints of the anterior and intermediate tarsi and the posterior tarsi entirely dark brown. Abdomen orange, excepting the first two segments and fasciæ on the

dorsum of the five or six following, gradually decreasing in extent, which are black. The deep black ovipositor is in striking contrast with the orange tint of the terminal segments; above it, on either side, are two white projections, with dark tips.

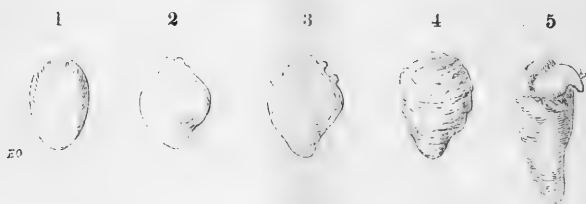
It is apparent from the above that my species differs greatly from that of the other writers. Swammerdam speaks of imagos entirely black, with black legs. Hartig observed no brown or yellow on the pronotum, and does not mention the abdomen or legs as having any orange tint, or that the stigma is yellow, in addition to which his description of the neururation differs from that of our species. Frisch seems to have found a species of *Pimpla* to be parasitic on his species. *Nematus gallicola*, Steph. (Westw. MS.), agrees pretty well as regards the coloration of the body and the legs, but differs in the colour of the stigma; it also appears that the trophi are black, and I see no mention made of the black mark on the femora. I have not thought it worth while to refer to Lepeletier's Monographie, as one cannot, as a rule, glean much from his descriptions, on account of their incompleteness.

The difficult question now remains, and it is one I shall not take upon myself to decide: Is *N. Lugdunensis* nothing more than a variety of *Vallisnerii*, brought about by its inhabiting the red willow? Would *Lugdunensis*, if transferred to the white willow, become *Vallisnerii* after one or two generations? So much is certain, that both in the larva and the imago the principal distinction consists in difference of coloration. It is only by making experiments on a large scale that this question can be determined.

POLIA FLAVOCINCTA LARVA FEEDING ON MAGNOLIA.—Two years ago a friend planted a young *Magnolia grandiflora* against the wall of his house, and last July was much vexed to find the greater part of the leaves more or less eaten and disfigured. After several evenings search he brought me the culprit,—a full-fed lepidopterous larva, which I failed to recognise until the imago emerged to-day. It turned out to be *Polia flavocincta*. This larva is known to be polyphagous enough with regard to low plants; but its attacking the hard, evergreen leaves of *Magnolia*, in a large garden, seems worthy of record.—EDWARD A. FITCH; Maldon, Essex, Sept. 29, 1877.

NOTES ON THE EGG AND DEVELOPMENT OF THE PHYTOPTUS.

By E. A. ORMEROD.



1. *Phytoptus* egg. 2. Egg showing contents. 3. Embryo *Phytoptus* as seen in turpentine. 4. Egg pellicle near hatching, showing striæ. 5. *Phytoptus* emerging from the egg. 1, 2, 5. From birch bud-galls. 3, 4. From leaf-galls of *Viburnum Lantana*.

THE extreme minuteness of the *Phytoptus* makes the study of its early stages and habits one of great difficulty; but by careful watching during the past summer I have gathered a few fragments, which, though disjointed and dispersed amongst various species, may still be of some interest.

The especial point in view was the egg. This, or at least an egg-shaped body from which a small but fully developed *Phytoptus* was excluded, I had previously found (Entom. x. 86) about the beginning of February in some numbers in the *Phytoptus* bud-galls (witch-knots) of the birch. What I then found were of a blunt oval form, produced at one end, transversely striate like the perfect *Phytoptus*, and becoming very irregular in shape before its exclusion; and, continuing the search, I found at the beginning of August what I take to be the earlier state of this egg. In this the egg is of a perfectly regular ovate form, larger at one end than the other, and without striæ; sometimes also slightly produced at the extremities as from pressure of the contained creature, and sometimes also when the time of hatching was at hand these eggs were to be found, as before, with the pellicle striated, the shape completely irregular, and the *Phytoptus* in the act of exclusion; and towards the end of August eggs were still to be found of a regular obtuse oval, till driven out of shape by the living tenants.

These various stages of the birch witch-knot *Phytoptus* are figured above, numbered respectively 1, 2, 5, and show the egg, the egg slightly altered, and the process of hatching; two intermediate stages are shown in figures 3, 4. These were from the pubescent *Phytoptus* galls on the leaves of *Viburnum Lantana* (wild guelder-rose), gathered on the 6th of August, at Wootton-under-Edge, in Gloucestershire, and show in one case (3) the clearness with which running a little turpentine over one of the egg-like bodies at the proper stage of development displays the figure of the gall-mite, and in the other (4) the presence of the striæ and the somewhat irregular form which appears to precede hatching.

In the case of the lime gall-mite I found a similar egg amongst *Phytopti* roaming about beneath the leaf, and also one slightly more obtusely ended in the *Phytoptus* gall of the sawfly leaf, but not having more advanced specimens to verify their contents by I cannot be absolutely certain of the nature of these eggs.

Looking at the progression (1 to 5, as figured) from the egg in its perfect form through the very gradual steps to the exclusion of the gall-mite, it appears to point to the smooth, obtuse, oval body being the true *Phytoptus* egg, and that the *Phytoptus* is excluded from it, as far as external form goes, in perfect development. I have never seen the gall-mite free itself entirely from the egg pellicle; but whether in the smallest size, corresponding with those of which only a portion showed projecting from the egg, or in the largest growth, I have not met with any variation of characteristics beyond colour and slight differences of figure. In autumn, as far as examination goes of the lime tree and common maple infested by *Phytopti*, the mite may frequently be found straying on the under side of the leaf, on the twig, and also sheltering in the crannies at the base of the leaf-bud, rather than in the galls; the mite-galls appearing sometimes entirely empty, sometimes inhabited.

On the maple leaf the galls vary much in size and shape, from the common irregularly-formed clustered and reddish galls of the upper side of the leaf (*Cephaloneon myriadeum*, Bremi), to the larger solitary kind in the axils of the veins, possibly the *Cephaloneon solitarum*; but in the specimens before me the steps from one form of gall to the other are so

gradual that I am unable to differentiate them. Beneath the maple leaves are (occasionally) a few very similar to these larger ones, but still more sparingly distributed, and differing like the surface on which they are placed in being more hairy, the aperture being commonly a simple depression into them from the upper surface of the leaves, whilst a fourth form or species appears beneath the leaf in swollen tubercular clusters, also pubescent, and often forming a ring on the under side of the leaf surrounding the aperture of the gall above.

During the last week of September pale yellowish fawn-coloured *Phytopti* were still to be found in some of these galls, and a little later I found a plentiful sprinkling of them amongst the hairs on the back of the leaf, or walking briskly along the maple twig; and on the 8th of October they were to be found on the maple buds, and on tearing this bud to pieces they were noticeable among the scales at the base, not apparently inside, but clinging where the leaf-stem and twig most sheltered the leaf-bud.

On the lime I found the *Phytopti* straying about the leaves on the 11th of September; and on the 12th of October they were to be found both beneath the leaf and—as in the maple—at the base of the leaf-buds. Some of these nail- or rather pointed cowl-like galls were on leaves of *Tilia grandifolia*, and relatively to these the legend given in Sir E. Smith's 'English Flora' (vol. iii., p. 21), may be of some interest,—of the old limes of this species in the churchyard of Sedlitz, in Bohemia, which were reported to have borne miraculously hooded leaves ever since the monks of a neighbouring convent were executed on them. An examination into the matter by some passing entomologist might give us an earlier date than we have at present for the observation of *Phytoptus* galls.

In the case of the birch "witch-knot" *Phytoptus* we have the hibernation of the gall-mite clearly in the diseased buds, though they may be elsewhere also; but in lime and maple the drying of the gall on the deciduous leaf, or the presence of decay or fungoid growths unfitting it for its tenant, naturally point to the fitness of the mite leaving its fallen home to seek a securer shelter. Its dispersion to neighbouring trees would also be brought about by the mite-

tenanted leaves being wafted by the wind and settling on the branches; and its living powers appear strong, as in specimens I have washed from the leaves, I have found vitality remaining after immersion of more than an hour and a half, in water with sufficient chloroform in it to be appreciable to taste and smell.

In the progress of search I have sometimes seen *Acari* in *Phytoptus* galls, and frequently found the *Phytopti* roaming amongst *Acari* on the exterior of the leaves; but though I have found the gall mite emerging as sketched (fig. 5), and also found empty pellicles showing the casting of the skin, yet even in the largest size—and especially on the 12th of October, when I had clear views with a quarter-inch glass of the mite as a transparent object inside the loose pellicle it had been about to cast—I have not seen any indications of steps from the typical form of the *Phytoptus* to that of any other *Acarid*.

Isleworth, October 13, 1877.

LIFE-HISTORY OF HELIOTHIS ARMIGERA.

By W. H. TUGWELL.

THE eggs of this species are extremely small for the size of the insect, nearly round and slightly striated, of a pale yellowish green, becoming a trifle darker before hatching, which takes place in five or six days. As the parent moth continues to deposit a few eggs each night for a period of fourteen days, and probably for a longer time when at liberty, those first deposited are hatched, and change skins once or twice before the last eggs are laid. Some of the first larvæ feed up rapidly, and become imagos the same season; but the bulk lie over in pupæ till the following year. The young larvæ are very sluggish, moving little, and eat only the lower surface of the leaf of the garden geranium or other food-plant. For the first fortnight they content themselves with this mode of feeding; they then commence to eat holes quite through the leaves, and no sooner is the hole sufficiently large to admit the head than they slowly crawl through it, only to eat another, and again and again repeat the process, so

that they soon make a plant look as if it had been riddled with shot. They also now commence to eat round holes into the succulent shoots and stems, burrowing quite into the plant, and evince a strong liking for the buds and flowers. They would soon prove most unwelcome guests to any lover of his bright-flowered geranium beds. An entomologist would most likely be glad to sacrifice Flora to his aurelian pet; but a gardener would wage a war of extermination. When about half grown the larvæ become terrible cannibals, eating their brothers or sisters with a zest and pertinacity quite horrible. They are mean and cowardly, generally seizing their weaker and more helpless brethren when about to cast their skins. As they became full fed they appeared to hold each other in mortal fear, and, like most guilty people, lived in constant dread of being arrested for past offences, for when touched by another larva, ever so slightly, they would wriggle, twist, and throw themselves off the plant to escape a fate they had possibly inflicted on others. When full grown and extended they are about an inch and a half long, of moderate thickness, slightly attenuated from the middle, both anteriorly and posteriorly; the head is about the size of the anterior segment, shining brown, slightly mottled with darker shades; on second segment is a coriaceous shiny plate or skin, giving it the appearance of being wet; the dorsal and medio-dorsal area is of a raw sienna-colour tinged with green, and pencilled in fine broken parrallel lines of yellow and darker shades, varying a little in tone in different individuals, but to no very great extent; there is a slight and interrupted dorsal line, formed by two fine oblong dark spots, edged with yellow on each segment, and a still more indistinct medio-dorsal line produced by four or six dark-coloured small warts, two or three on either side of each segment, and each emitting a short bristly hair; the spherical line is sharply defined, of a pale ochreous, lined above, first with a fine yellow and then a dark umber line, and below by a white line; the legs and claspers are pale ochreous; ventral surface a colourless gray, with three white lines. The pupa is subterranean; and the moth appears in August, September, and October.

3, Lewisham Road, Greenwich.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

PAPILIO MACHAON IN SUSSEX.—When in Brighton on Saturday last I was informed, on good authority, that two larvæ of *Papilio Machaon* had been found in July last, feeding on carrot, in a field near the Brighton Race Hill; and that an imago of this species had been captured near Hastings in August last. If we add these captures to those recorded by Mr. J. Jenner Weir, in the October number of the 'Entomologist' for 1876, and by Mr. A. B. Farn, in the October number of the 'Entomologist' for 1877, we find that no less than ten specimens of this insect, either in the larva or imago state, have been recorded from Sussex and Kent during the last twelve months. From the fact that these specimens have been found in four different localities, three of which are a considerable distance apart, it seems improbable that they were purposely introduced.—H. Goss; Surbiton Hill, Surrey, October 12, 1877.

THECLA QUERCUS FEEDING ON SALLOW.—I have on several occasions in May and June beaten the larva of *Thecla quercus* from sallow, which has been growing in the woods among oaks, but I always thought they had got there by being blown down or falling by accident from the oaks above; but to my astonishment when passing through the same wood on August 29th I saw a female at rest on a sallow. Pulling down the branch very carefully I saw that she had deposited an egg on the leaf on which she rested. I boxed her, and she obliged me with another egg, so that I could compare them; which I did, and found them identical. I then sent the egg and leaf on which it was deposited to the Rev. J. Hellins, who at once recognised it as the egg of *T. quercus*. Can we now venture to say that the food is sallow as well as oak?—G. C. BIGNELL; Stonehouse, Plymouth, September 21, 1877.

BREEDING COLIAS EDUSA.—Beginning of August, two females captured; from August 11th to 15th, eggs laid on *Medicago sativa*; 16th to 20th, eggs hatched. September 28th, first larvæ attached for changing. October 8th, first pupæ. A number of the larvæ still feeding. The majority of those which attached themselves for changing died before the process of pupation was completed. Were fed on lucerne (*Medicago sativa*). I have also some larvæ feeding, bred

from females captured August 16th and 18th, and September 2nd. The female captured on the latter date lived until September 26th.—A. J. WINDYBANK; Kingston-on-Thames, October 15, 1877.

COLIAS EDUSA, ACHERONTIA ATROPOS, AND SPHINX CONVULVULI AT HARWICH.—This year *Colias Edusa* has been very abundant here. A considerable number of pupæ of *Acherontia Atropos* have been found here this autumn. When taking up potatoes one man informed me he destroyed nine before he knew what they were. Two specimens of *Sphinx convolvuli* were captured here on September 3rd and 7th.—F. KERRY; Harwich, September, 1877.

ACHERONTIA ATROPOS.—This species has appeared in this locality (Norwich) in the larva state in sufficient numbers to be worthy of note. I have, as well as many of my friends, obtained several larvæ and pupæ, one of which made its appearance on the 30th of September, but was unfortunately a cripple, the wings not being developed. I am anxiously awaiting the emergence of the others.—ROBERT LADDIMAN; Upper Hellesdon, Norwich, October 19, 1877.

SPHINX CONVULVULI AT PUTNEY.—A specimen of this insect was captured by a friend of mine, at Putney, September 5th.—ARTHUR J. ROSE; Mutlah Lodge, College Avenue, Hackney.

DEILEPHILA LIVORNICA.—I was staying at Shanklin in the early part of August, and happening to go into a jeweller's shop there, kept by a Mr. Billings, saw a specimen of *D. livornica*, which had been brought alive to him by a little girl a day or two before. He kindly gave it to me; but unfortunately it had been set with a common pin, and was minus the antennæ. On getting it home I relaxed and re-set it; and with the exception of these defects it is a good specimen.—JOHN LOGAN SHADWELL; Malvern House, Thicket Road, Upper Norwood, Surrey.

DICRANURA BICUSPIS AND ACRONYCTA ALNI IN STAFFORDSHIRE.—On June 13th last I had the good fortune to find a fine male *Dicranura bicuspis* on one of a row of alder trees, about three miles from this place. It was close to its cocoon, from which it had evidently emerged that afternoon. About five years ago we took one in exactly the same manner on another tree in the same row, not more than three or four yards away. It struck me at the time that I would, later in

the season, try the same trees for the larva of this species; so on August 25th I set to work with the beating-net, and beat all the lower branches, such as I could reach. The result was no larvæ of *D. bicuspis*; but, what was quite as good, I took no less than five larvæ of *Acronycta alni*—two of them nearly full fed, and the other three in the earlier stage, so well described, in the September 'Entomologist,' by your correspondent Mr. J. P. Barrett. Two of these three certainly, if not all of them, moulted twice before assuming the well-known appearance of the full-fed larva. The earlier moult in no way altered the dingy colour described by Mr. Barrett, except, as would be expected, it became somewhat brighter, or rather less dingy; the same close resemblance to a bird-dropping remained; but the final moult produced a marvellous transformation—from a dirty white, of more or less intensity, to a bright purple-black, with glorious golden dashes, is a truly wondrous change, hardly to be credited if not seen. In the earlier stages there are indications of the remarkable clubbed hairs, so characteristic of the full-grown larva; and the habit of bending back the first three segments close to the body when asleep on the surface of a leaf is the same. Having been so fortunate I beat a few days later some more alder trees hard by, but with no success, so I determined to beat the same trees over again. I did so on September 5th, and got two more, both nearly full grown. They have fed up but slowly; and the last of the seven only went into pupa yesterday. I have them all safe in bits of hollow stick; and next June I shall be all anxiety to see the result.—[Rev.] T. W. DALTRY; Madeley Vicarage, Newcastle, Staffordshire, September 25, 1877.

ACRONYCTA ALNI NEAR DERBY.—We have been fortunate enough to pick up three larvæ of *Acronycta alni* this season: one, August 14th, from a sloe bush under alders; a second, September 7th, beaten from low poplar suckers, also at the roots of an alder; and a third, September 19th, from the heart of a standard apple tree, some ten feet from the ground, no other kind of tree near. All three occurred within a quarter of a mile of this house. They had undergone their last moult, and donned that handsome livery of black tagged velvet turned up with gold, which is so different from the sober costume of their earlier stages, described by Mr. Barrett in the 'Entomologist' (Entom. x. 237). That gentleman,

by-the-bye, will find his savoury similitude for it forestalled in a communication of mine to the E. M. M. for November, 1868, vol. v., p. 144. Nos. 1 and 3 spun up safely in dried stems of *Heracleum* provided for them. No. 2 was unfortunately wounded by the beating-stick.—[Rev.] HUGH A. STOWELL; Breadsall Rectory, Derby.

LARVA OF *ACRONYCTA ALNI* AT RUGBY.—On Thursday, September 28th, I found here a larva of *Acronycta alni*, which had unfortunately been trodden on by a passer-by, so that its tail was crushed; and this I fear makes it impossible that it should come to maturity. Still the capture is no less worth recording. I may mention perhaps that the last time *A. alni* was recorded as taken in this neighbourhood was just twenty years ago, when two larvæ were taken by me in the school close here, both of which died in the larva state. In all these cases the larvæ were taken on or near elm trees.—ARTHUR SIDGWICK; Rugby, September 30, 1877.

HELIOTHIS ARMIGERA NEAR HARTLEPOOL.—On September 5th a female of *Heliothis armigera* was taken here by Mr. J. Burn, who occasionally collects for me. It was captured about nine o'clock at night, when flying round ragwort flowers. This is the first time the species has occurred in this locality, though the food-plant is excessively abundant.—JOHN E. ROBSON; Hartlepool.

LEUCANIA ALBIPUNCTA AND *L. VITELLINA* IN THE ISLE OF WIGHT.—On September 1st I took at sugar, in the Isle of Wight, a very fine specimen of *L. albipuncta*, and another on the 5th; and also on this evening one *L. vitellina*.—J. KENWARD; 14, Effingham Road, Lee.

CAPTURES IN STAFFORDSHIRE.—I have been pretty successful in taking the usual birch and alder larvæ, namely, *Acronycta leporina*, *Notodonta dictæoides*, *N. dromedarius*, *Platypteryx falcata*, *P. lacertula*, &c.; the last three being tolerably common. Sugar has been no use at all in this district all the year, and I have scarcely taken a moth by means of it. *Eupithecia debiliata* was very plentiful in July: in two short afternoons I took over one hundred and thirty; but insects have generally been scarce here. The spring was very late, and the summer has been very wet and cold; indeed, we have had little else but rain for more than twelve months.—[Rev.] T. W. DALTRY; Madeley Vicarage, Newcastle, Staffordshire, September, 1877.

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VARIETY OF *CLEORA GLABRARIA*.

By H. Goss, F.L.S., F.Z.S., &c.



CLEORA GLABRARIA (VARIETY).

THIS variety of *Cleora glabraria* was captured in the New Forest about four years ago, by Mr. Gulliver, of Brockenhurst, from whom I obtained it.

In typical specimens of this species the wings are dingy white, dusted with small black dots; but in the specimen figured above the black dots are so numerous and so minute as to give the insect a dark and smoky appearance, and to render some of the ordinary markings very obscure. The central spot is larger but less clearly defined than usual, and with the spot on the costa, with which, as in ordinary specimens, it is connected, forms a dull blotch. Most of the usual spots and markings are confluent, but the second line is much more sharply defined and more acutely angled than in typical specimens, and is bordered with white on the side nearest the hind margin. Of the three species of the genus *Cleora* occurring in this country, *Glabraria* is, according to my experience, less liable to variation than either of its congeners. This fact renders this specimen additionally interesting.

During the last ten or twelve years a considerable number of specimens of this species, both bred and captured, have come under my observation; but, with the exception of the striking variety figured above, I have never remarked in any of them any noticeable departure from the usual markings and colouring, though specimens vary considerably in size.

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY,

Assist.-Naturalist in the Museum, Royal Dublin Society.

No. V. NYMPHALIDÆ—ELYMNIINÆ AND MORPHINÆ.

THE subfamily *Elymniinæ* contains but two genera,—*Elymnias* and *Dyctis*: the cells of all the wings are closed, the costal nervure of the fore wings is much swollen at the base; and the males are furnished with pencils of hairs on the hind wings. The larvæ have cephalic spines, forked tails, and a smooth skin. All the species, except two, which are African, are Indo- or Austro-Malayan, and most of them mimic other butterflies—*Danaus*, *Euplœa*, *Tenaris*, *Delias*, and *Acrœa*; they may, however, readily be distinguished from all these genera by their dentated, and often angulated, wings. They are generally dark-coloured insects, with the fore wings either plain or spotted with blue or white, and in many species the hind wings are bordered with orange. The female of *E. undularis* mimics *Danaus Chrysippus*: it is tawny, with broad brown borders spotted with white on all the wings; towards the tip of the fore wings the spots are confluent, and form a band. The African species—*Dyctis Phegea* and *Bammakoo*—mimic different species of *Acrœa*: the fore wings are brown, banded with fulvous in the former and white in the latter; the hind wings in both species are brown, paler towards the base, and covered with brown striæ. On the under side most of the *Elymniinæ* are finely striated with brown, and the group has a family likeness, which renders it easy to recognise, in spite of its resemblance to other butterflies. *Dyctis Agondas*, of New Guinea, which mimics the genus *Tenaris*, is dirty white, with brown borders, and two or three large blue spots on the hind wings.

The *Morphinæ* are a group of butterflies perhaps only artificially separated from the *Nymphalinæ*. Some of them approach the *Satyrinæ* in appearance, and probably in habits; but the typical genus *Morpho* comprises some of the largest and most splendid butterflies known, and, except a superficial resemblance to the *Brassolinæ*, cannot be confounded with anything else. All the genera, except *Morpho*,

which is Tropical American, are East Indian. The hind-wing cells of the imago are open (which separates them from the *Brassolinæ* and *Satyrinæ*), and the larvæ of many of the genera have forked tails, thus approaching the *Satyrinæ* and *Brassolinæ* on one side, and some of the true *Nymphaliniæ*—such as *Apatura*—on the other. We will now consider the principal genera of the *Morphinæ* separately.

Amathusia Phidippus is a brown Javanese butterfly, four inches across, with rather pointed fore wings, and with the hind wings produced into a short and very broad tail; beneath, the hind wings have two large brown eyes dusted with yellow, with white pupils marked below with black, and enclosed in yellow and black rings; each angle of the broad tail is marked above and below with a black spot, bordered outside by a white crescent. It flies at dusk, like some of the *Satyrinæ* and *Brassolinæ*. A few allied species are found in North India, Java, and Sumatra.

The species of *Zeuxidia* also come from the Malay and Philippine Islands. Most of the species are dark brown, banded and spotted with blue on the fore wings and near the margins of the hind wings; the under side is brown, with a transverse darker line across all the wings, and with two small eyes on the hind wings. The wings of *Z. Luxerii* are more pointed than in *Thaumantias* (mentioned below), but are not hooked, as in *Kallima*, a genus of *Nymphaliniæ*, to which it has some resemblance; and the hind wings are produced into a short, pointed tail, marked with white below. *Z. Aurelius*, Cram., from Sumatra, is one of the largest Old World species of the group: it is six inches in expanse, chestnut-brown above, and darker towards the margins, which are marked with rows of large white spots; the under side is striped with white and pale brown.

The species of *Discophora* are brown, with the fore wings more or less pointed, and the hind wings dentated, and generally angulated; there is a large silky patch of scales on the hind wings of the males; the fore wings have two or three rows of blue spots towards the hind margins, or are banded and spotted with tawny, and the hind wings are either plain or spotted with tawny; there are also two small eyes on the under side of the hind wings. This genus is met with from North India to Timor and Gilolo.

Enispe is confined to continental India. The species resemble large Fritillaries, being tawny, with brown borders, and broad zigzag brown markings on all the wings; the hind wings have two very small eyes beneath. The genera of *Nymphalinae*, which it most resembles, are *Cirrochroa* and *Cynthia*; from the latter it may be superficially distinguished by its rounded hind wings, and from the former by the heaviness of the dark markings above, and the absence of a silvery line and of a row of small spots beneath, which are found in most *Cirrochroa*.

The species of *Tenaris* are found as far west as Java, and east to Otaheite, but are most numerous in the Papuan Islands. The genus is one of the most unmistakable among butterflies. The species average about four inches in expanse, and are brown, more or less mingled with white; the hind wings have two large black eyes enclosed in broad, yellow, and narrower brown outer rings, containing a small white pupil surmounted by a bluish crescent. The species differ chiefly in the amount of white on the wings and the distinctness of the eyes above.

The species of *Clerome* resemble the *Satyrinae* more than any other butterflies of this group. They are two or three inches in expanse; several are tawny-brown above, and are distinguished by their under sides. *C. Eumeus* has a more distinct tawny band across the fore wings above, and a row of white spots across all the wings beneath; *C. Arcesilaus* has a row of small yellow dots beneath; and *C. Phaon* and *Stomphae* have two large eyes on the hind wings beneath; the former has a narrow yellow stripe, and the latter a broad white one on the fore wings beneath. *C. jaunula*, from Malacca, is a larger species: fore wings pale brown; hind wings buff; beneath dirty white, with broad zigzag black lines; the inner margin of the hind wings is rich fulvous, especially below.

Thaumantias, the last of the Old World genera of *Morphinae*, also comes nearest to the American genus *Morpho* in size and beauty, the species measuring from four to six inches across the wings. The smaller species, *T. Odana*, *Diores*, &c., are dark brown, with suffused bluish purple markings, sometimes extending over a great part of the wing, and sometimes occupying only a limited portion

of the surface; the hind wings have two distinct black eyes beneath, more or less surrounded with yellow. Of the larger species, *T. Aliris* has a broad white band on the fore wings, and one or two white spots on the costa nearer the tip; the hind wings have two yellow blotches on the hind margin, the one at the anal angle very large; on the under side there are two very large eyes. *T. Howqua* is rich tawny, with irregular black spots on all the wings above; beneath there are five red eyes on each wing, with white pupils, and yellow and black outer rings. *T. Nourmahal* is similar, but reddish brown, with a dull tawny band across the fore wings, and a row of tawny spaces between the black marginal spots; on the under side there are but two eyes on the fore wings, and three on the hind wings, the intermediate ones being merely red spots. *T. Camadeva*, from North India, is the commonest of the large species: towards the base it is tawny-brown, darker outwardly on the hind wings; the disk of the fore wings, a row of marginal spots on all the wings, and a larger second row on the hind wings, is iridescent bluish white, with an outer row of square black spots, and more or less traces of a second row of round ones on the fore wings; each wing has five red eyes beneath, nearly as in *T. Howqua*, but larger. A species closely allied to *Camadeva* has been described from Cambodia.

No one can mistake the great South American species of *Morpho* for any other butterflies: they are slender bodied, day-flying insects, with a row of eyes on all the wings beneath; the wings vary a little in shape, being much longer and narrower in some species than others; they are generally dentated, and are occasionally produced almost into a short tail; they vary from about three to eight or nine inches in expanse. We may take *M. Perseus*, *Laertes*, *Æga*, *Sulkowskyi*, *Cypris*, *Menelaus*, and *Achilles*, as the representatives of groups. *M. Perseus* is of a rich dark brown, with the base of all the wings grayish blue in the male, except a broad brown space running from the base of the fore wings along the costa for two-thirds of its length. The female has the bluish portion replaced with orange on the greater part of the fore wings and the middle of the costa of the hind wings. The largest *Morphos* (*M. Hecuba* and *Cisseis*) are also of a prevailing orange tint. *M. Laertes* and

allies have broader wings, and are of a pale silvery blue, becoming almost white in some species, such as *M. Polyphemus*. They are about five or six inches across. *M. Æga* is a small species, about three inches across; the male is of a rich metallic blue, with two white spots on the costa near the tip of the fore wings; the hind wings are pointed, and almost tailed at the anal angle; the female is dull orange, with one white spot near the tip, and the hind margins are brown, spotted with orange. *M. Sulkowskyi* is rather larger and of a similar shape, but of a paler, more violet-blue, showing different colours in different lights; the bands and eyes of the u.s. show through, especially in the female, which is bordered with brown on the fore wings, and has alternate narrow marginal bands of yellow and brown on the hind wings; the tip is brown in the male, and the anal angle is brown, with three small orange spots, in both sexes. The most splendid deep metallic blue of the whole genus is seen in the males of *Cypris* and *Rhetenor*. The male of the former has two rows of white spots, the inner forming a band on the hind wings; and the male of the latter has no white. The female of *Cypris* is dimorphic, being either blue or orange; that of *Rhetenor* is orange. These species measure about four and a half to six inches across. The species allied to *Menelaus* and *Achilles* are of a much less changeable colour, and have broader wings than those last mentioned. *Menelaus* is of a rich purplish blue, and measures five or six inches across; the margins are brown towards the tips of the fore wings, with a white spot in the male; in the female the borders are broader and spotted with white. *Achilles*, and the numerous species or varieties allied to it, vary from four to six inches across, and are brown, with a blue band across the middle of all the wings, varying much in breadth and intensity, and sometimes extending nearly to the base; the tips in the male and the hind margins in the female are generally more or less spotted with white.

The long-winged species of *Morpho* have an extremely lofty flight, sailing about the tops of the trees or along the alleys of the forest, from twenty to one hundred feet from the ground. Hence, with the exception of the New Granadan species (*M. Cypris*, *Sulkowskyi*, &c.), which are taken with long nets among the precipices of the Andes, and which may

occasionally be purchased at a comparatively moderate price, the only *Morphos* which are common in collections are *M. Menelaus*, *Achilles*, *Laertes*, and their allies, which have a rapid but undulating flight nearer the ground, on which they sometimes settle to suck the juice of fallen fruit.

The magnificent *M. Cypris* has occasionally been used in Paris to ornament ladies' head-dresses; but butterflies are far too fragile to be conveniently employed for this purpose.

Monographic revisions of the *Elymniinæ* have been published by Wallace in the Transactions of the Entomological Society for 1869, and by Butler in the Proceedings of the Zoological Society for 1871. The Oriental *Morphinæ* were monographed by Westwood in the former publication, 2nd series, vol. iv.

ENTOMOLOGY AT TRESCO AND THE SCILLY ISLES.

By the Rev. H. HARPUR CREWE, M.A.

DURING the latter part of August and the beginning of September I was the guest of Mr. Dorrien-Smith, at Tresco Abbey, in the Scilly Isles; and whenever an opportunity offered I investigated the Entomology of the islands. My investigations were, however, mainly confined to the Island of Tresco, upon which I happened to be located. I only visited the other islands occasionally, and always in the day-time, when there was very little stirring, though some of the downs or commons on St. Mary's, covered with *Ulex nanus* and *Calluna vulgaris* in full bloom, looked most tempting, and at night might very possibly have produced some good insects. I took nothing, however, worth mentioning, except a single specimen of *Heliothis peltigera*, which was flying in the bright sun over the heather. *Macroglossa stellatarum*, *Plusia gamma*, *Scopula ferrugalis*, and *Stenopteryx hybridalis*, occurred in myriads on all the islands. *Vanessa Atalanta*, *V. cardui*, and *V. urticæ*, were most abundant; but I looked in vain for *V. Antiopa*, and did not see a single specimen of *V. Io*. The only other butterflies I came across were *Pieris brassicæ*, *P. napi*, *P. rapæ*, *Satyrus Janira*, *Polyommatus Phlæas*, and *Lycæna Alexis*.

On the islands of Tresco and St. Mary's there are some large fresh-water pools of great antiquity, thickly fringed

with reeds, and having on the former island a scrub of sallow and heather growing close up to the water; but though I sugared the large masses of ragwort flowers carefully, I took absolutely nothing, except *Leucania impura* and *L. pallens*.

During the last fortnight of my visit I sugared the flowers of the numerous shrubby New Zealand *Veronics* in the Abbey gardens almost every night. I took *Agrotis lunigera* (a single specimen), *A. tritici*, *A. puta*, *A. saucia*, *A. suffusa*, *A. segetum*, *Noctua plecta*, *N. C-nigrum*, *N. rubi*, *N. xanthographa*, *Cerigo Cytherea*, *Triphæna orbona*, *Apamea oculea*, *Phlogophora meticulosa*, *Melanthia rubiginata*, *Camptogramma bilineata*, *Eupithecia pumilata*, and a single specimen of the rare pearl, *Margarodes unionalis*. *Sphinx convolvuli* was common hovering over various flowers at dusk, but the specimens were all more or less battered. A single specimen of *Acherontia Atropos*, apparently fresh from the pupa, was brought to me by the gamekeeper, who caught it in his cottage. The gardener told me that the tomato plants had been much eaten by some large larva; I suspect *A. Atropos*. There is a good deal of *Euphorbia paralias* on the islands, and I searched it carefully for the larva of *Deilephila euphorbiæ*, but in vain. I described it to the gamekeeper, who is a very observant man, and he said he was almost sure he had seen it. The larvæ of *Eupithecia centaureata* and *E. absynthiata* were abundant on ragwort flowers, and I swept a few of *E. nanata* from those of *Calluna vulgaris*; but I saw no trace of any other *Eupitheciæ*. The only other larvæ I saw were *Hadena oleracea*, *H. chenopodii*, *Mamestra brassicæ*, *Dianthæcia capsicola*, *Chelonia caja*, *Acronycta rumicis*, *Arctia lubricipeda*, *A. menthastri*, and *Euchelia Jacobæ*. *Acidalia promutata* occurred on banks near the sea, at St. Mary's.

I omitted to say that *Colias edusa* was not nearly so common as in Buckinghamshire, where it has been more or less abundant since May. I did not see a single *C. hyale* or *Helice*.

An entomological friend, who had been a guest at the Abbey for some weeks before my visit, took, in addition to the insects already named, *Agrotis obelisca*, *Triphæna interiecta*, *Hadena pisi*, *Dianthæcia conspersa*, *Leucania littoralis*, *Lithosia quadra*, *Eupithecia subnotata*, *Cleora lichenaria*,

Ourapteryx sambucata, *Cledeobia angustalis*, *Stenia punctalis*, *Endotricha flammealis*, and *Herbula cespitalis*. I did not collect *Crambites*, *Tortrices*, or *Micros*.

This list is meagre in a climate where all the plants of Australia, the Cape, New Zealand, &c., flourish with almost native luxuriance.

The indigenous Flora of the islands, however, though select, is rather scanty. The past summer has been cold and ungenial; and the weather during my visit was often showery and rough. I quite think that anyone who worked the islands carefully from May till October would be amply rewarded.

The keeper of the lighthouse on St. Agnes told me that the glass was often covered with moths.

Drayton-Beauchamp, Tring,
October 31, 1877.

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR's 'Die Mitteleuropäischen Eichengallen.'

By EDWARD A. FITCH.

(Continued from p. 251.)



Fig. 75.—S. NERVOSA.



Fig. 76.—A. MARGINALIS.

75. *Spathegaster nervosa*, Gir.—This rare gall may be found in May and the beginning of June on the leaves of *Quercus cerris* as a spherical swelling on a side-rib, about the size of a pea, and equally protuberant on each side of the leaf, in such a manner that either the whole rib with the

bordering tissue is inverted in the gall, or that that portion of the rib which joins the midrib remains unaltered, and only the outer portion becomes employed in its formation. It thus happens that the outer half of the gall lies at the edge of the leaf (as is generally the case with the galls of *Andricus curvator*). The gall occurs as a small ball at the end of this side-rib, or if, perhaps, composed of leaf parenchyma as a small lobe; sometimes the leaf margin shows as a seam on the periphery of the gall. The gall itself is, like that of *S. baccarum*, translucent, green, and covered, but not thickly, with very short branched hairs like the leaf. When the gall comprises the whole side-rib the leaf generally becomes curled up on that side. The section exhibits a soft parenchyma, with a cavity in the centre, in which the larva lives. The gall-fly appears at the middle of June.—G. L. MAYR.

This is a Turkey-oak species, consequently it does not occur in Britain. Dr. Mayr mentions *Synergus thaumacera* and *Callimome incertus* as inquiline and parasite, both appearing at the end of June or beginning of July. Both these insects are curiously inconstant in their life-history: that of *Callimome* has been referred to (Entom. x. 208), and *Synergus thaumacera*, Dalm. (= *Klugi*, H. = *luteus*, H. = *carinatus*, H.) is said to live in five widely separated Turkey-oak galls and three common oak species; also in some cases it appears in the summer of the first year, whilst in others it winters in the gall, and is not disclosed till the next April.—E. A. FITCH.

76. *Aphilothrix marginalis*, Schlechtendal.—Under this name Herr v. Schlechtendal has described a gall which, according to his account, is to be found at the end of April or beginning of May, and becomes mature by the beginning of June. The typical specimens now before me are on the leaves of *Quercus sessiliflora*, and grown through the leaf surface, some starting from the midrib, others from a side-rib. The galls are almost oviform, 2 to 3·6 millimetres long by 2 to 2·5 millimetres thick; in the dried state greenish yellow or brown (when fresh—on the authority of the describer—light green streaked with red), and more or less deeply ribbed longitudinally; the parenchyma of the gall is rather thin, and the chamber large. One example, which occurs on the midrib and is remarkable for its deep ribs, so

greatly resembles the gall of *Andricus quadrilineatus*, Hart., that I am unable to separate one from the other; and the probability that the producer is *A. quadrilineatus* cannot be overlooked.—G. L. MAYR.

In 'Mitteleurop. Eichengallen,' ii. 52, this species appears as ? *Cynips marginalis*; but, in 'Verh. d. zool-bot. Ges.,' xxii. 689, Dr. Mayr says he sees, from a specimen sent him by Dr. Meischner, that the gall-fly is an *Aphilothrix*. It is not known as a British species.—E. A. FITCH.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

PAPILIO MACHAON IN KENT.—My brother took a perfect male specimen of *Papilio Machaon*, near Herne Bay, last August, and missed another. It is smaller than the fen specimens.—BERNARD COOPER; Higham Hill, Walthamstow, October 23, 1877.

VANESSA ANTIOPA, TRIPHÆNA SUBSEQUA, AND OTHER CAPTURES, NEAR HASTINGS.—The most notable of my captures in this neighbourhood during the last eighteen months have been *Vanessa Antiopa* (a fine female on a Cossus-affected tree, September 28th, 1876), *Apatura Iris*, *Sphinx convolvuli*, *Macroglossa fuciformis* (the broad-bordered species), *Selenia illustraria*, *Emmelesia unifasciata* (at dusk, Crowhurst Wood, June, 1876), *Stauropus fagi*, and *Triphæna subsequa* (bred from a larva found in Hollington Wood). I do not think this species is so rare as is generally supposed. I took it several years ago near Malvern, and remember its capture at Birdlip Wood, near Cheltenham; and now I know it as a Hastings and Petersfield insect. I have also taken the dark brown variety of *Strenia clathrata*, with a few white spots, but in a locality in which I never found one of the ordinary type. The *Lepidoptera* of Hastings seem remarkably similar to those of parts of Hampshire, especially the New and Woolmer Forests.—E. K. ROBINSON; Quebec House, St. Leonard's, October 19, 1877.

LATE APPEARANCE OF LYCÆNIDÆ.—On the 4th of October I took five specimens of *Lycæna Adonis*; two very small *L. Icarus (Alexis)*, no larger than *L. Alsus*; and saw several *L. Corydon*, so perfect that they might be a second brood.

I saw *Sphinx convolvuli* on the evening of the 2nd of October, but missed catching it.—V. R. PERKINS; Wotton-under-Edge, October 25, 1877.

ACHERONTIA ATROPOS.—A fine specimen of *Acherontia Atropos* was captured in this neighbourhood on August 19th, this year. It was brought to me alive. Was not this an unusual time for its appearance?—H. MILLER; Ipswich.

[The appearance of this species seems altogether uncertain. Generally the imagos emerge in the autumn (October), but a very small percentage appears to pass the winter in the pupa state, and is developed early in the following summer (May and June). Probably your specimen was an unusually early example of this year's brood. It is also said that the autumn produced specimens are infertile; and this is doubtless true, as, considering the general food-plant (the potato), it is impossible that eggs can be laid in the autumn. I may state that the larvæ have been common in Essex this autumn.—E. A. F.]

ACHERONTIA ATROPOS AND SPHINX CONVULVULI AT SEA.—On the 8th of October an engineer of one of the Dublin Steam Packet Company's steamers brought me a live *Acherontia Atropos*, which alighted on a crate of cabbages on deck when twenty-five miles off the Irish coast; and on the 6th of October, last year (1876), *Sphinx convolvuli* alighted on the same steamer. Both insects are now in my collection.—T. WEST; 1, St. Leonard's Terrace, Ashfield Street, Liverpool.

SPHINX CONVULVULI IN WARWICKSHIRE.—I had the pleasure of receiving a specimen of *Sphinx convolvuli*, brought to me in fair condition, and taken at Kingswood, Warwickshire, September 20th, from some children who were playing with it.—G. H. MELSON; 68, Newhall Street, Birmingham, October 6, 1877.

CHEROCAMPA CELERIO AT EASTBOURNE.—A very fair specimen of *C. celerio* was brought me last Tuesday (October 30th). It was captured by a gardener amongst the leaves whilst sweeping a lawn.—W. E. PARSONS; 64, Langley Road, Eastbourne, November 5, 1877.

LAPHYGMA EXIGUA AT CAMBERWELL.—On the 13th of this month I was fortunate enough to secure at sugar, in the garden here, a fine specimen of *Laphygma exigua*, which I

identified this afternoon by the Doubleday collection, at Bethnal Green.—J. M. C. JOHNSTON; Tudor House, 203, Upper Grove Lane, Camberwell, October 27, 1877.

DIANTHÆCIA IRREGULARIS, ANTICLEA SINUATA, HELIOTHIS DIPSACEA, AND SPILODES PALEALIS.—The larvæ of *Dianthæcia irregularis* have this year been still more infested by ichneumons than usual: out of about sixty caterpillars I do not expect more than half a dozen moths. The larva of *Anticlea sinuata* has been fairly numerous at Lackford; so, too, that of *Heliothis dipsacea*. Several captures of *Spilodes palealis* have been made near Bury St. Edmund's, and also near Thetford.—[Rev.] A. H. WRATISLAW; School Hall, Bury St. Edmund's, November 1, 1877.

PARASITE OF BOMBYX RUBI.—In the October 'Entomologist' (Entom. x. 258) the discovery of a larva of *B. rubi* with some small cocoons adhering to its hairs was reported. These cocoons have also come under my observation this year; but I should certainly say that they *did* belong to the creature, and had not, as surmised, become accidentally attached to the skin. A large larva which I picked up in Woolmer Forest, on September 12th, had certainly nothing upon it at the time of capture; but during the journey home it evolved no less than six cocoons, and seemed none the worse for the operation, for it ate greedily, and crawled actively about. But the next day, when the production of several more during the night had convinced it that it was useless to struggle against fate, it curled itself up and died.—E. K. ROBINSON; Quebec House, St. Leonard's, Oct. 19, 1877.

[Cannot some correspondent supply us with either the name or specimens of this parasite? The study of parasitism generally is particularly interesting, and, as all who have studied *Hymenoptera* know, the economy of many species is particularly involved, and is likely to remain so in this country unless more individual records are kept. Probably no country contains a relatively larger band of lepidopterists, many of whom devote much time to the breeding of species. The number of despised *Ichneumonidæ* thus met with is large; but if lepidopterists would accurately ticket these species for naming and future record, the progress would be great. Not only would very important facts in the life-histories of the *Lepidoptera* and other orders—the preyed upon—be

established, but by this means the economy of the preyers themselves would be elucidated. It may be quoted as an instance of "our utter ignorance," that when Mr. Riley was in this country he attended the July (1875) meeting of the Entomological Society, and there expressed a wish for a supply of *Microgaster* cocoons for purposes of acclimatisation in America to lessen the ravages of the naturalised *Pieris rapæ*. The meeting was well attended, and the request was published in several journals; but it was not till some time subsequently that the question was raised by Mr. M'Lachlan, whether we have a *Microgaster* parasitic on *P. rapæ* at all; whether the well-known *Apanteles* (*Microgaster*) *glomeratus* is not exclusively confined to *P. brassicæ*. Such is, I believe, the case. At the December (1876) meeting of the Society Mr. Meldola related his experience; and during this year I have examined scores of larvæ and pupæ of *P. rapæ* without any sign of *Microgaster*; so if judgment may be allowed to go by default the purpose of Mr. Riley's request would be futile. But what a lesson to British entomologists: *Pieris rapæ*, our commonest and best observed butterfly, and the *Microgaster* cocoons, unlike many parasites, particularly observable.*—E. A. F.]

LEPIDOPTERA NEAR YORK.—In this neighbourhood the season has generally been a bad one, especially for larvæ; however, *Smerinthus ocellatus* has been plentiful, upwards of one hundred larvæ having been taken. I met with *Acidalia immutata* in the bog this year for the first time; I also saw several small larvæ of *Collix sparsata*, but did not take them, intending to do so later, but was prevented by the continuous rain. I have again bred the black variety of *Amphydasis betularia* (two males and one female); likewise three intermediate ones, one of which has a broad black border to the fore wings; the other two are black, dotted all over with white. I also bred a fine male *Cymatophora fluctuosa* this spring, from a larva taken in 1876. *Acronycta*

* On October 26th, 1877, Mr. W. C. Boyd found a larva of *Pieris rapæ* on a fence at Cheshunt, on which was a cluster of the little yellow *Microgaster* cocoons. With his usual kindness Mr. Boyd gave them to me, after exhibition at the Entomological Society; so I hope to determine the species. The specimens were found after the above was written, showing that negative evidence is again at fault, but the lack of observation is still established.—E. A. F.

eporina has not occurred this season, but was common last.—THOMAS WILSON; Holgate, York, October, 1877.

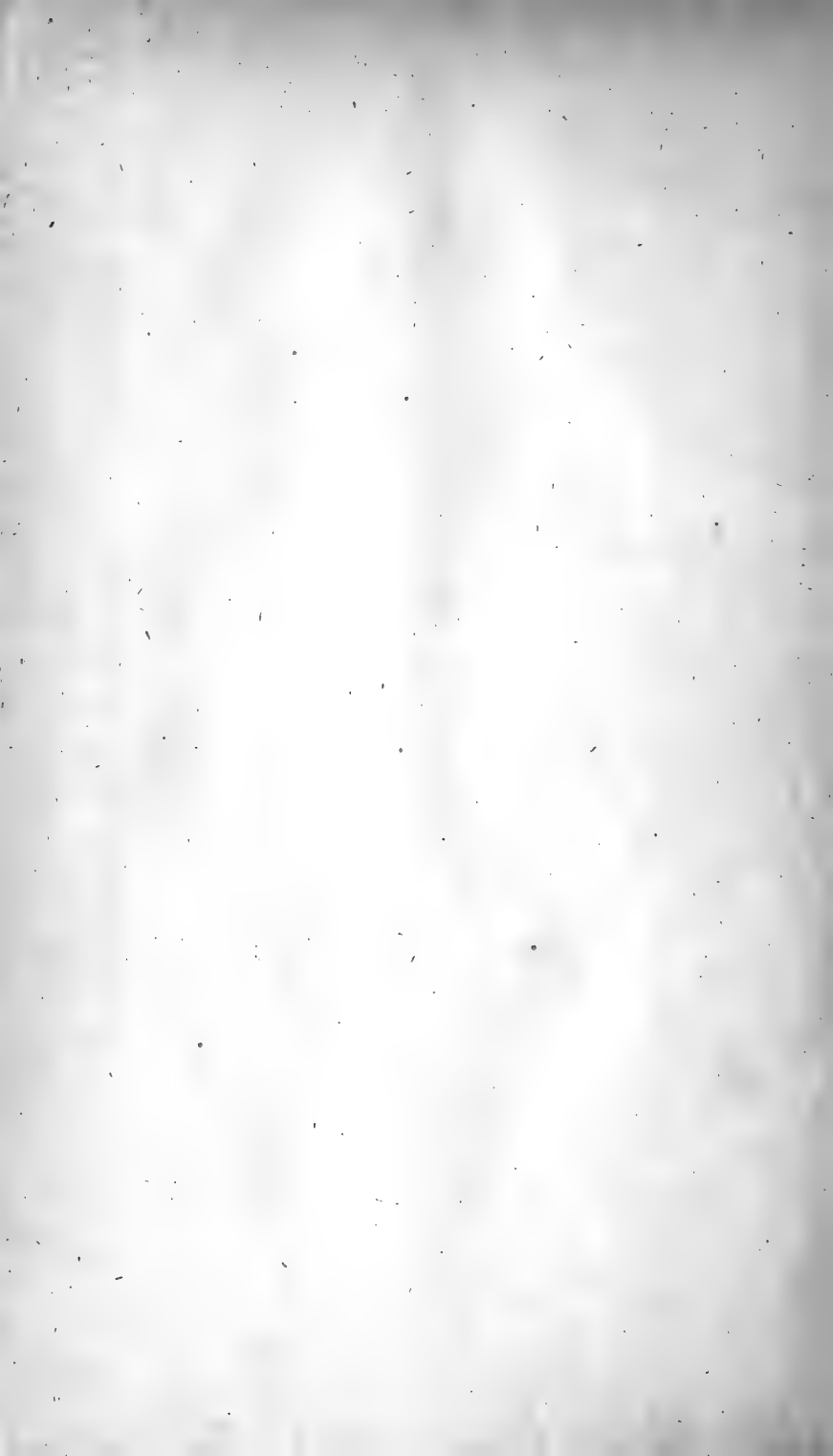
CAPTURES NEAR PETERSFIELD, HANTS.—My brother and myself in six weeks, ending September 19th, captured the following:—*Thecla pruni*, *Lycæna Ægon*, *Liparis monacha*, *Pachynemidia hippocastanaria*, *Thera variata*, *T. firmata*, *Noctua glauca*, *N. neglecta*, *Anchocelis rufina*, and *Epunda lichenea*; very abundant. *Lithosia complana*, *Melanippe procellata*, *Scotosia undulata*, *Epunda nigra*, *Anarta myrtili*, *Stilbia anomala*, and *Hypena crassalis*; common. *Selidosema plumaria*, *Eupithecia succenturiata*, *Phibalapteryx vitalbata*, *Eubolia palumbaria*, *Platypteryx unguicula*, *Cænobia rufa*, *Luperina cespitis*, *Miana literosa*, *Agrotis puta*, *A. aquilina*, *A. agathina*, *A. porphyrea*, *Noctua plecta*, *Anchocelis litura*, and *Erastria fuscata*; a few specimens. *Apatura Iris*, *Limenitis sibylla*, *Emmelesia unifasciata*, *Camptogramma fluviala*, *Phibalapteryx lignata*, *Chesias obliquaria*, *Nonagria fulva*, *Triphæna subsequa*, *Cucullia asteris*, and *Plusia orichalcea*; single specimens. *Lobophora sexualisata*, *Dicranura bifida*, *Stauropus fagi*, *Clostera reclusa*, *Acronycta alni*, *Hadena pisi*, *H. thalassina*, *Cucullia lychnitis*, and *C. asteris*; larvæ. *Emmelesia unifasciata* was taken among some hazel and clematis bushes on Whetham Hill, August 18th: it was flying in bright sunshine, but most probably had been disturbed by my forcing a way through the clematis. *Plusia orichalcea* was beaten out of a hedge of clematis on Whetham Hill, about August 18th: it flew across the road and fell upon its back upon the path; I thought it was only *P. chrysitis*, and picked it up by one wing; my surprise may be imagined when I saw what a prize I had so carelessly secured; I have also met with a single specimen at rest in the daytime upon a flower-head of ragwort. *Triphæna subsequa* I took from my bedroom window. My brother found the larva of *Acronycta alni* on an oak bough in August last, at Harting Coombe, near Rake; it was then almost full grown, but soon died, a victim to ichneumons.—E. K. ROBINSON; Quebec House, St. Leonard's, October 19, 1877.

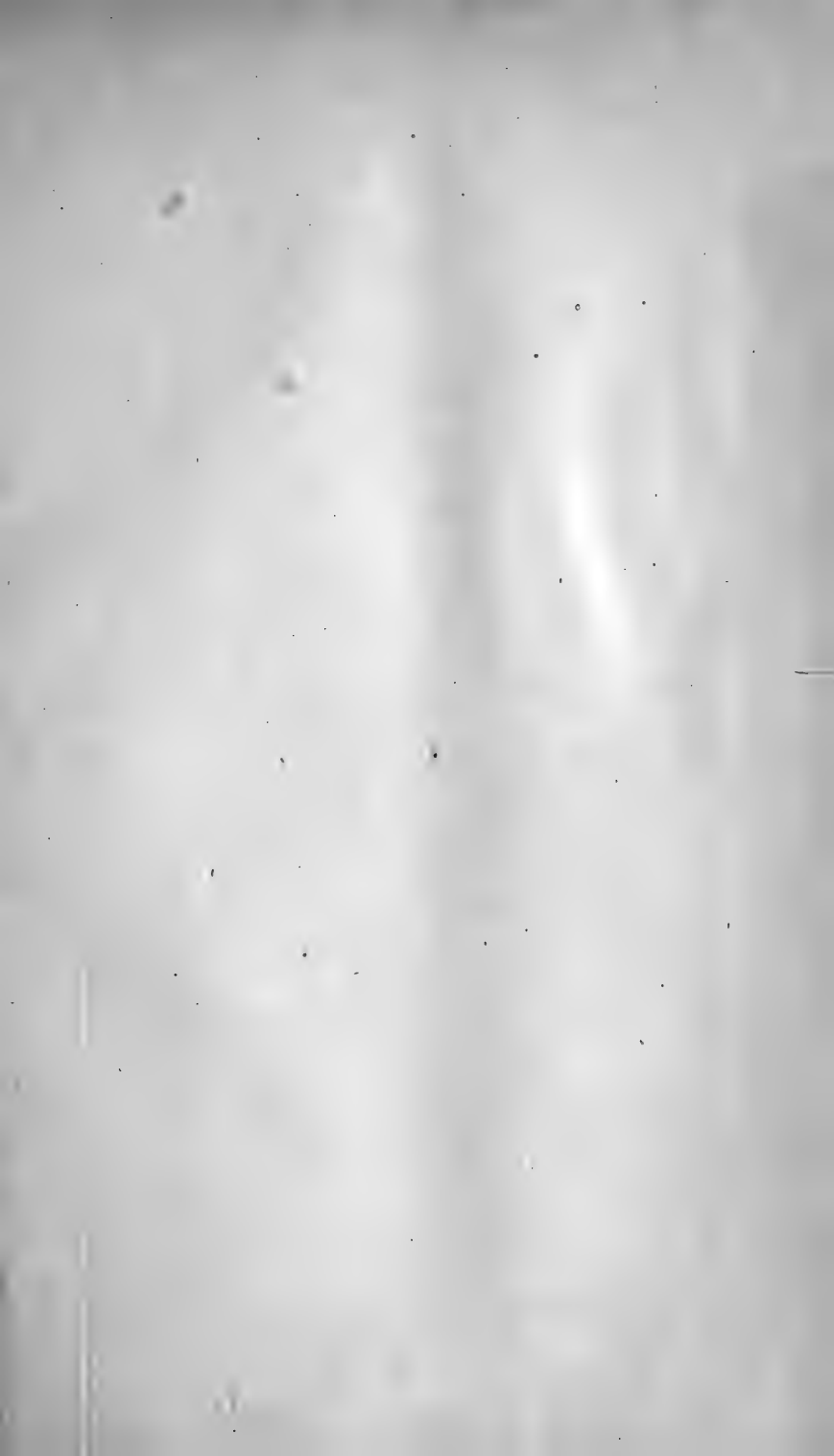
LEPTOGRAMMA SCABRANA BRED FROM THE EGGS OF L. BOSCANI.—Having captured females of *Leptogramma Boscana*, on the 15th of July last, I placed them in a

large-mouthed pickle-bottle. I obtained eggs on the 17th of that month, laid on the sides of the bottle in little green patches. On the 24th I noticed little black specks in the eggs; the next day they hatched. Having placed some elm in the bottle and covered the mouth up with fine muslin, I turned it bottom upwards, and left it for a week. Upon examination I found the larvæ had curled the edge of the leaf over and fed on the surface. Having been supplied with fresh food they drew two leaves together, and fed on the surface as before. On August 20th they attained the size of half an inch, and came out of their web occasionally and fed on the edge of the leaf. On the 28th they drew two leaves together for the last time, for they were all in pupa by the 3rd of September. On the 29th the first imago appeared. It was, as I expected, a true *L. scabrana*. I have bred seventeen in all. The larvæ are pale green, with a few hairs scattered on each segment; head, plate on second segment, and feet, black. I think this is enough to prove that the difference in colour is merely a protection. *L. Boscana* is on the wing during the first and second week in July; while *L. scabrana* needs protection for seven months. I have found it at rest during the winter with its wings lapped round the twigs of the elm, which makes it very difficult to see. I have tried twice before to breed this insect. In 1875 I kept *L. scabrana* alive from October until March of the following year. They died without depositing eggs. In July, 1876, I had eggs of *L. Boscana* deposited in a chip box: they hatched, but I failed to rear them. It has been said that I must have made a mistake. I will ask one question: Does any entomologist know of a locality for the one that does not produce the other?—W. WEST; 6, Green Lane, Greenwich, November 10, 1877.

AROMIA MOSCHATA IN SCOTLAND.—A beautiful specimen alighted on the neck of a gentleman while fishing near Moniaive, sixteen miles from Dumfries, on September 3rd. He secured the insect, and presented it to me on his return; and Dr. Sharp now tells me it is the first one he has heard of in Scotland.—ROBT. SERVICE; Maxwelltown, Dumfries, N.B., November 8, 1877.

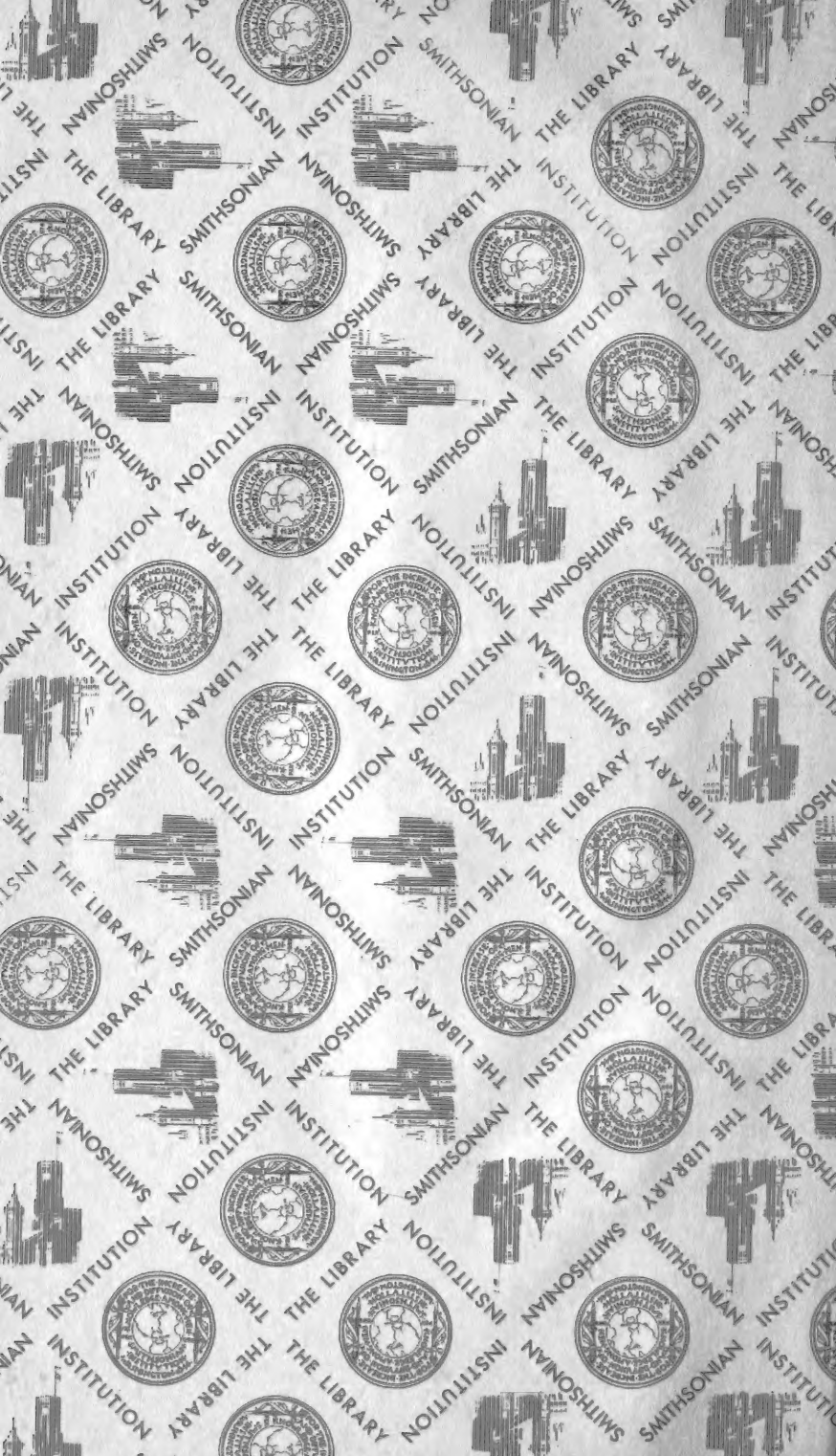


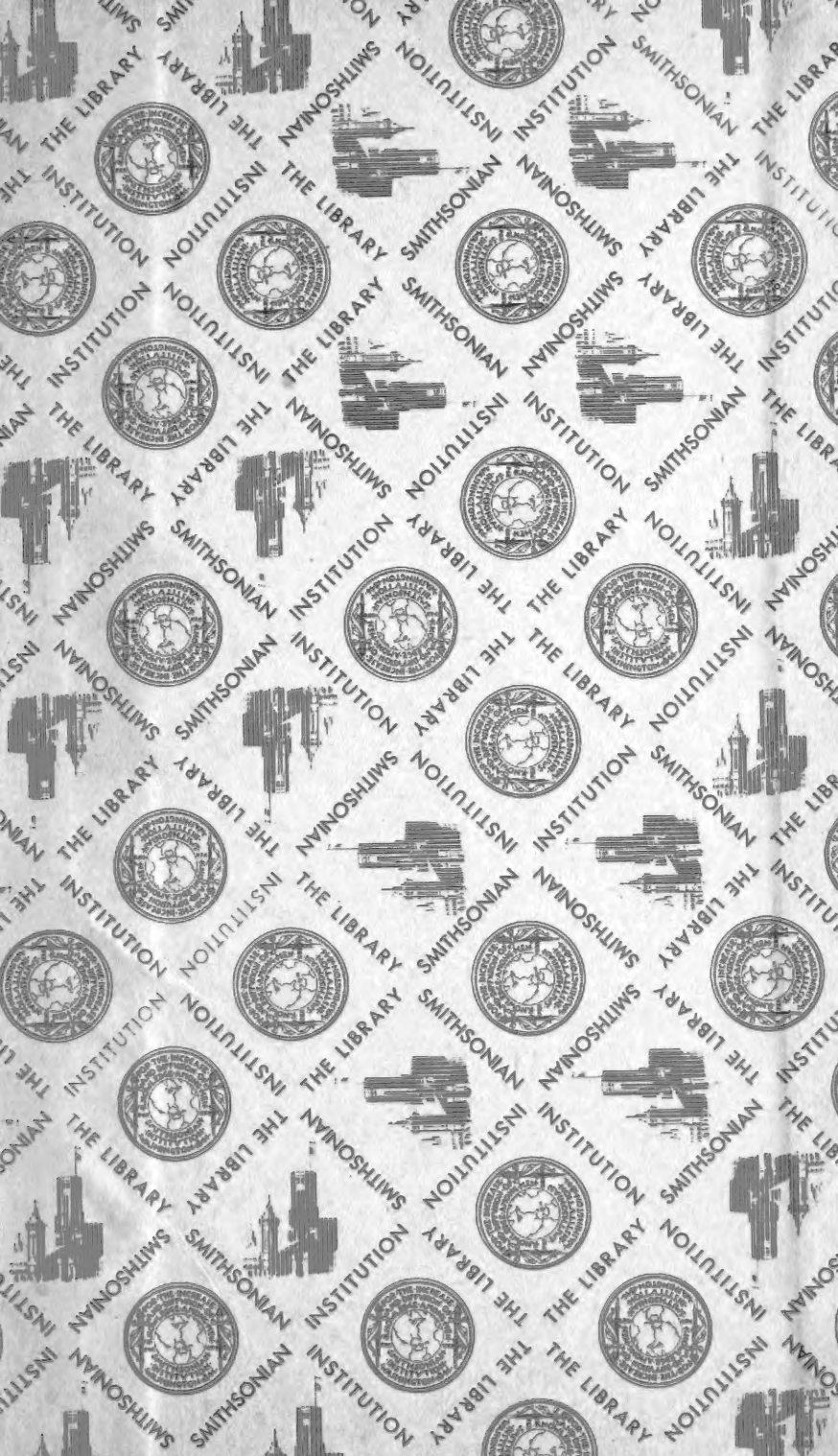












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